COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF INTERNAL AFFAIRS

CRUDE OIL RESERVES

OF

PENNSYLVANIA

By

WILLIAM S. LYTLE

TOPOGRAPHIC AND GEOLOGIC SURVEY
BULLETIN M 32
1950

PENNSYLVANIA
GEOLOGICAL SURVEY
FOURTH SERIES
BULLETIN M 32

CRUDE OIL RESERVES OF PENNSYLVANIA

By
WILLIAM S. LYTLE

DEPARTMENT OF INTERNAL AFFAIRS
WILLIAM S. LIVENGOOD, JR., *Secretary*

TOPOGRAPHIC AND GEOLOGIC SURVEY
S. H. CATHCART, *Director*

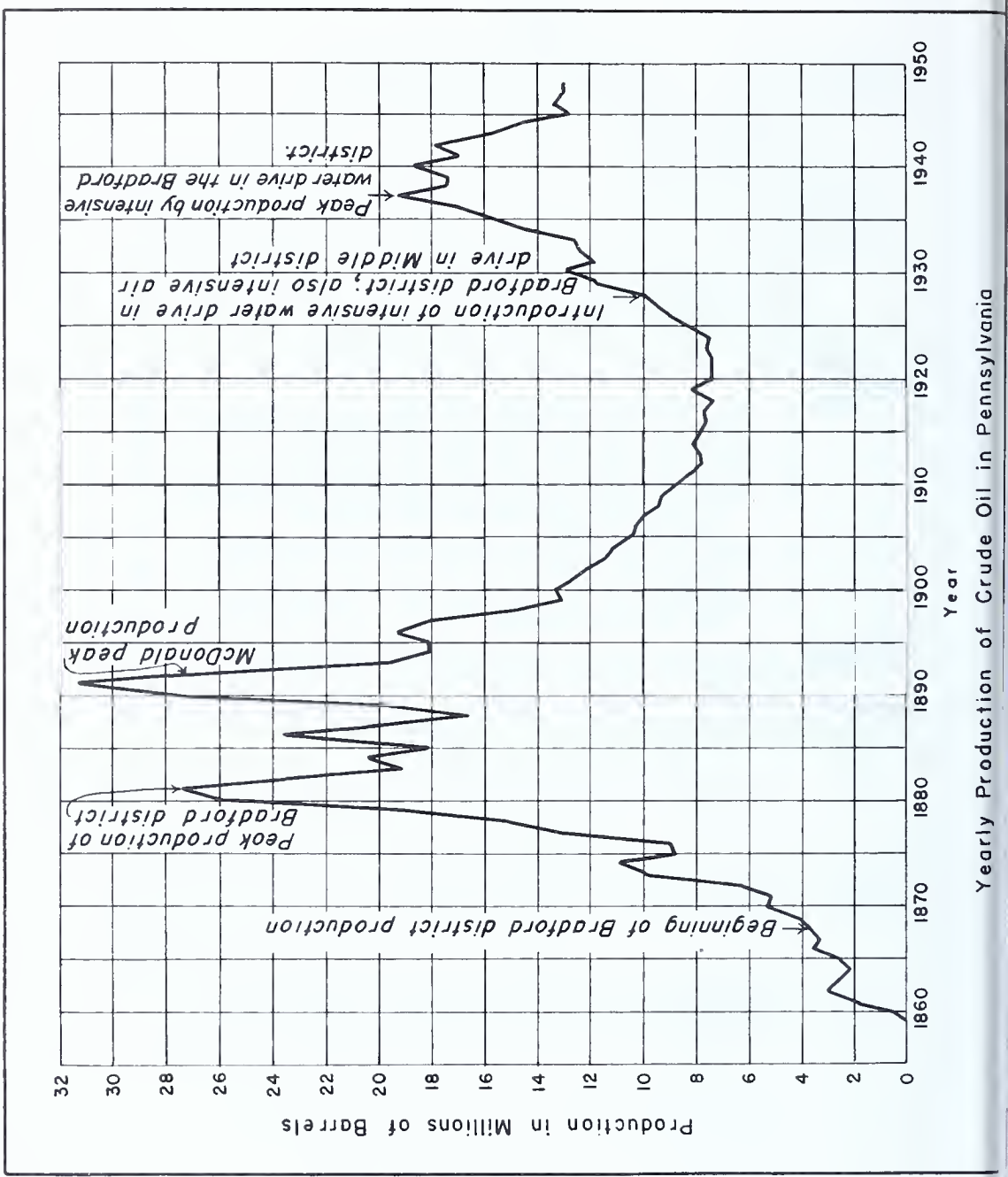

Figure 1. Annual production of crude oil in Pennsylvania, showing the influence of certain events upon the production curve.

CRUDE OIL RESERVES OF PENNSYLVANIA

By William S. Lytle

INTRODUCTION

General Statement

A Joint Stripper Well Committee, sponsored by the Interstate Oil Compact Commission, The Independent Petroleum Association of America, and the National Stripper Well Association, was organized to instigate a survey of the oil reserves of the stripper well oil fields in the United States. In Pennsylvania the stripper well study was undertaken by the Pennsylvania Geological Survey at the request of J. P. Jones, Director of Production for the Pennsylvania Grade Crude Oil Association and member of the Joint Stripper Well Committee.

Acknowledgements

For aid given in this survey, the writer is indebted to the following companies and individuals: Messer Oil Co.; South Penn Oil Co.; United Natural Gas Co.; Washington Oil Co.; Robert B. Bossler; Larry S. Matteson; E. M. Tignor; Charles R. Fettke; coöperating geologist with the Pennsylvania Geological Survey; Albert I. Ingham and Wilbur H. Seifert, Survey staff members. Thanks are due the Pennsylvania Grade Crude Oil Association and the Joint Stripper Well Committee for their stenographic assistance. John R. Ebright, a member of the Pennsylvania Geological Survey staff, assisted in the field work and preparation of the report. Margaret Cox Lang of the Survey staff did the drafting.

OBJECTIVES OF THE STUDY

There are only a few wells in Pennsylvania which do not fall into the stripper well category, therefore all of the 164 oil fields in Pennsylvania were investigated. The objectives of the stripper well survey were to provide:

(1) Crude oil reserve estimates for each county by fields and for the entire state as of January 1, 1947.

(2) Statistics on producing wells and crude oil production by county

and for the entire state.

(3) Statistics on the production and value of crude oil in Pennsylvania and in the United States.

(4) A summary of secondary recovery operations in Pennsylvania oil fields, as of January 1, 1950.

(5) A description of each oil field.

SOURCE OF INFORMATION

This report was compiled using information from publications of the Second, Commission (Third), and Fourth Pennsylvania Geological Surveys, the Pennsylvania Bureau of Statistics, the U. S. Geological Survey, the U. S. Bureau of Mines, and various technical journals. Data were also obtained from oil producers, from unpublished reports and core analyses.

All statistics from 1886 to 1918, unless indicated otherwise, were taken from Mineral Resources of the United States, published by the U. S. Geological Survey. Figures for 1921 to 1948 are from Report on Productive Industries, Public Utilities, and Miscellaneous Statistics, Bureau of Statistics, Pennsylvania Department of Internal Affairs. All county production figures reported by this agency represent crude oil produced within county limits. Statistics on the production of individual fields have not been compiled. Pennsylvania Geological Survey Bulletin M19, Contributions to the Oil and Gas Geology of Western Pennsylvania, summarizes production figures up to 1932.

METHOD OF STUDY

A standard form has been adopted for reporting data on individual fields. In some cases, fields in the same area and with similar characteristics are grouped and reported on a single form. The original field name is used in most cases, but when a group of fields are reported together, a field name combining two or more fields is used. The discovery date, the name of the discovery well, and the initial production of the discovery well are recorded when known.

The fields are grouped by counties, and the township, county, and quadrangle in which the field is located are reported. When a field lies in more than one county, each portion is discussed under the county in which it occurs, unless otherwise stated, and the county and township names of adjacent portions are shown in parentheses. The Bureau of Statistics, Pennsylvania Department of Internal Affairs, reports production by counties, and the compilation of reserves by county consequently has been followed in compiling the report.

The number of producing and abandoned wells are recorded when available, but such figures are lacking for many fields. Sand names, taken from manuscripts and published reports, and productive acreages, determined by planimeter from maps showing productive limits, are recorded for each field, producing or inactive.

The date of the reserve estimate for each field or group of fields is given on each field data sheet, in most cases it is January 1, 1947. The estimates for some fields, taken directly from other reports, are of an earlier date. In these cases the reserves shown in the county summary tables for these fields are adjusted to January 1, 1947, by subtracting from the earlier reserve figure the oil actually produced between the time of that estimate and January 1, 1947.

It is not possible to obtain production figures for most fields. For the few fields where production statistics are available, the primary production curve has been compared with the secondary recovery curve to determine what the field, having reached settled production without secondary recovery methods, could ultimately produce by primary methods alone.

DEFINITIONS

A concise, clear-cut definition of terms is the fundamental basis for producing a usable estimate of oil reserves since the significance of this estimate can vary considerably with differing interpretations of certain of these terms. Defined here are critical terms as they are used in

compiling this estimate of reserves:

1. Primary production. The oil accumulated in a bore hole by force of gravity and other natural forces within the producing horizon and brought to the surface by commonly used methods of flowing or pumping.
2. Secondary recovery methods. The application within a reservoir of artificially developed energy or forces, such as air or gas drive and water flooding, not naturally brought to bear in primary production.
3. Stripper well. A well producing 10 barrels or less of crude oil per day.
4. Total oil in place. Estimated total amount of oil remaining in a pool or field as of January 1, 1947.
5. Oil recoverable by primary methods. Estimated amount of total oil in place which is recoverable without the use of secondary recovery methods. The amount of oil recoverable by primary methods is assumed to average about one-tenth of that probably recoverable by secondary methods.
6. Oil proved recoverable by primary plus secondary methods. Estimated amount of oil economically recoverable with good operating practices by present known methods of secondary recovery.
7. Oil probably recoverable by secondary methods. A less conservative estimate than 6 (above) of oil recoverable, assuming more intensive application of present known secondary methods, and a smaller margin of profit.
8. Oil possibly recoverable by secondary methods. An optimistic estimate of the amount of oil that may ultimately be recovered by present known secondary methods under the most favorable economic conditions. Acreage considered submarginal under

6 and 7 (above) may become productive.

9. Residual oil content. That portion of the total oil content remaining after the recovery of all oil possible by present known secondary methods.

FACTORS IN RESERVE ESTIMATION

General Statement

On the field data sheets oil fields are recognized as productive or potentially productive with the application of the following secondary recovery methods: (a) intense water flooding, (b) intense air or gas drive.

To date, experience has shown that the Bradford field and other fields producing principally from the Bradford Third sand are particularly suited to water flooding, whereas the sands of the Middle District and Southwestern Pennsylvania are generally more amenable to air or gas drive.

Reserve figures are calculated from core information. In general a volumetric method is used in estimating the oil reserves. The necessary data collected, determined, or estimated are the average thickness of pay sand, the total oil content of the pay sand in barrels per acre-foot, and the number of acres of oil-bearing sand. The product of these factors is the estimated total oil content. Using the same procedure and substituting the amount of oil recoverable in barrels per acre-foot for total oil content in barrels per acre-foot, the quantity of oil recoverable is determined. Reserve estimates for parts of the Middle District are quoted from reports by Parke A. Dickey. In certain instances Dickey used the term "pay sand" in a qualified sense, restricting it to zones of high saturation, but in computing the estimated residual oil content he used this thickness of pay or pays plus a thickness of marginally oil-saturated sands. In such cases, the pay thickness copied from Dickey on the field data sheets cannot be used directly in computing the estimated total oil content.

Among the water-flooding fields, there is an abundance of core data available for the Bradford field, but such information is scant or lacking

for some other fields. Core data are less common in the air- and gas-drive fields. Of these fields, the most information is available in the Middle District; very few core data have been collected in Southwestern Pennsylvania.

When specific core information is lacking for the calculation of reserves of either water-flooding or air- and gas-drive fields, it is necessary to assume certain arbitrary constants. Outlined here are the specific core data and, where core data are lacking, the arbitrary constants used to formulate the reserve estimate of water-flooding and air- or gas-drive fields.

Water-Flooding Fields

Fields which have been successfully operated or are considered amenable to operation under water drive are classified on the field data sheets as water-flooding fields.

Oil proved recoverable by primary plus secondary methods ranges to over 304 barrels per acre-foot (Fettke 1948, Project #3) for portions of some fields. Oil probably recoverable by secondary methods may be as much as 350 barrels per acre-foot in some areas, and about one-fifth to one-tenth of this amount is estimated recoverable by primary methods alone. Oil possibly recoverable by secondary methods may be over 400 barrels per acre-foot for some properties.

Abundant reliable core data are available for the Bradford, Clarendon, Shingle House, Burning Well, and Guffey fields. For most other fields there are some cores available, but the data in some instances are not representative of the field as a whole.

Air- or Gas-Drive Fields

A residual oil content of 150 barrels per acre-foot, as established by Dickey (1941, p. 21), has been used for all air- or gas-drive fields. It is assumed in all fields that the oil recoverable by primary methods will amount to approximately 1/10 of the oil probably recoverable by secondary methods.

In fields where core data are available, the oil estimated as possibly recoverable by secondary methods varies from 50 to 300 barrels per acre-foot. Following Dickey (1943), it is assumed that the oil probably recoverable using secondary methods amounts to about 40 per cent of that possibly recoverable. Approximately one-half of the probably recoverable oil is classed as proved recoverable by primary plus secondary methods.

In the fields where core data are lacking, very conservative arbitrary standards have been adopted in estimating the reserves. A value of 50 barrels per acre-foot is assumed for the oil probably recoverable in these fields, using secondary methods; the factual information is so limited that no additional oil has been claimed possibly recoverable. Oil proved recoverable is restricted to oil recoverable by primary methods alone.

ESTIMATION OF OIL RESERVES

In Pennsylvania on January 1, 1947, it is estimated that there were 2,734,434,000 barrels of oil remaining in the known reservoirs (Tables 1 & 2) and that a cumulative total of 1,096,984,000 barrels of oil had been produced (Table 7), including 10 million barrels that ran to waste in the early boom days. From this it is computed that the original crude oil content of the known oil reservoirs in Pennsylvania was about 3,831,418,000 barrels. Of the oil remaining as of January 1, 1947, it is estimated that 224,462,000 barrels are proved recoverable by primary plus secondary methods.

The peak year in production by primary methods was 1891, when a total of 31,424,000 barrels was produced (fig. 1, facing p.1). This peak was largely due to the flush production of the McDonald field. Following a period of declining production, a secondary peak was attained in 1937, when 19,990,000 barrels of crude oil were produced largely by secondary methods. In that year production from

McKean County amounted to 16,454,744 barrels, most of which came from the Bradford pool. In 1946 the annual production had declined to 13,261,000 barrels, coming from 79,967 wells on 625,193 productive acres and with an average daily production of 0.45 barrel per well.

In Pennsylvania, fields which will ultimately produce over 25,000,000 barrels of oil may be considered major fields. These are Bradford, Bullion-Clintonville, Butler Cross Belt, Clarendon, Foster-Reno, Knox, McDonald, Oil City-Rouseville, Pleasantville, and Washington-Taylorstown.

The total remaining crude oil and the proved recoverable reserves of McKean County are greater than those of any other county. This area is currently producing about one-half of all of the Pennsylvania-grade crude oil and 80 per cent of the total production in Pennsylvania. About 1,074,970,000 barrels were originally contained in the Bradford pool, of which 382,906,000 barrels had been produced as of January 1, 1947. It is estimated that the Bradford pool will ultimately yield a total of about 500,000,000 barrels of oil — about 8 times as much as will be produced by any other field in Pennsylvania.

Large reserves of oil remain in Venango, Butler, and Warren counties of the Middle District, but at present this area is producing only about 12 per cent of the Pennsylvania total. Many fields in the Middle District should respond favorably to secondary recovery methods and produce much additional oil.

Southwestern Pennsylvania, south from Butler County, currently produces about 8 per cent of the Pennsylvania total. Most fields in this district have not been subjected to secondary recovery methods, but, in the few cases where secondary methods have been applied, recoveries have been very good, indicating that other projects may be expected to be successful. Very few cores have been taken in Southwestern Pennsylvania; therefore little is known about the physical characteristics of the reservoirs. It is likely that the assumed value of 50 barrels

per acre-foot of oil probably recoverable, determined from data in the Venango fields, is much too conservative for some of the Southwestern fields. The following facts indicate that oil saturations in the sands of this area may be a great deal higher than the average saturations in the Venango fields:

(1) Wells are more widely spaced than in the Venango fields, and the sands are therefore presumably less depleted.

(2) The average daily primary production of wells is about 5 times that of wells in the Venango fields.

(3) Recoveries of 50 to 100 barrels of oil per acre-foot under gas drive can be obtained only with close well spacing in the Venango fields, whereas such recoveries have been realized with much wider spacing in gas-drive projects in Southwestern Pennsylvania.

Though the oil reserve estimates have been based on core analyses, it is recognized that the core data are not infallible. Cores are exposed to the flushing action of drilling fluids in the well, and the oil-water ratio is directly related to the amount of flushing action, which is largely dependent upon the physical properties of the core. The Bradford Third sand, a hard fine-grained sandstone of low permeability, probably does not suffer the same degree of flushing by the drilling fluid as does a coarse-grained, loose, highly permeable sand, such as the Venango sands. If true, then an analysis of the Bradford Third sand core is more truly representative of the actual properties of the reservoir rock than an analysis of a Venango sand core. It may be, therefore, that the total oil in place is actually greater than the 2,734,434,000 barrels obtained in this estimate, since the residual oil value of 150 barrels per acre-foot used for computing reserves in air- or gas- drive fields is based on Venango sand cores which may have been subjected to excessive flushing.

Water-flooding projects have been tried in 31 of the 164 oil fields of Pennsylvania. Flooding was successful in 11 fields, unsuccessful in 17, and data are lacking for the 3 remaining fields. Of 83 fields subjected to air- or gas- drive projects, operations were successful in 55 fields, unsuccessful in 24, and data are lacking on 4 fields. A summary of the status of secondary recovery operations in the Pennsylvania oil fields is given on pages to Some of the fields classed as unsuccessful may not be thoroughly tested as to their secondary recovery potentialities, and there are a number of fields which have not been subjected to any secondary recovery method.

REFERENCES

Ashley, George H., 1931, A Syllabus of Pennsylvania Geology and Mineral Resources, Pa. Geol. Survey, 4th Ser., Bull. G1.

——— and Robinson, J. French, 1922, Oil and Gas Fields of Pennsylvania, Pa. Geol. Survey, 4th Ser., Bull. M1, vol. 1.

Butts, Charles, 1904, Kittanning Folio, U. S. Geol. Survey, Geol. Atlas 115.

——— 1910, Warren Folio, U. S. Geol. Survey, Geol. Atlas 172.

Carll, John F., 1883, Geological Report on Warren County and the Neighboring Oil Regions, Pa. 2nd Geol. Survey, Rpt. I 4.

Cathcart, S. H., 1934, Gas and Oil in Potter County, Pennsylvania, Pa. Geol. Survey, 4th Ser., P. R. 106.

——— Sherrill, R. E., and Matteson, L. S., 1938, Geology of the Oil and Gas Fields of the Tidioute Quadrangle, Pa. Geol. Survey, 4th Ser., P. R. 118.

Clapp, F. G., 1907a, Amity Folio, U. S. Geol. Survey, Geol. Atlas 144.

——— 1907 b, Rogersville Folio, U. S. Geol. Survey, Geol. Atlas 146.

DeWolf, Frank W., 1929, Topographic and Geologic Atlas of the New Castle Quadrangle, Pa. Geol. Survey, 4th Ser., Bull. A5.

Dickey, Parke A., 1941, Oil Geology of the Titusville Quadrangle, Pennsylvania, Pa. Geol. Survey, 4th Ser., Bull. M22.

——— et al, 1941, Report to the Petroleum Coordinator for National Defense, on the Kane to Butler District of Pennsylvania, (Unpublished).

——— and Bossler, Robert B., 1942, Oil Recovery by Air and Gas Repressuring in Pennsylvania, A.P.I., Sec. Recovery of Oil in the U.S., pp. 90-108.

——— Sherrill, R. E., and Matteson, L. S., 1943, Oil and Gas Geology of the Oil City Quadrangle, Pennsylvania, Pa. Geol. Survey, 4th Ser., Bull. M25.

Fettke, Charles R., 1937, Bradford Oil Field (prelim. rpt.), Pa. Geol. Survey, 4th Ser., P. R. 116.

——— 1938, Bradford Oil Field, Pennsylvania and New York, Pa. Geol. Survey, 4th Ser., Bull. M21.

——— 1941, Music Mountain Oil Pool and other Oil Pools in Lafayette Township, McKean County, Pennsylvania, Pa. Geol. Survey, 4th Ser., P. R. 125.

——— and Seifert, W. H., 1946, Haskell Sand Core from the Coryville Pool, McKean County, Pennsylvania, Pa. Geol. Survey, 4th Ser., P. R. 131.

——— Stephenson, Robert C., and Tignor, E. M., 1946, Oil and Gas Developments in the North Strabane Area, Washington County, Pennsylvania, Pa. Geol. Survey, 4th Ser., Bull. M28.

Fettke, Charles R., 1948, Water Flooding in Pennsylvania, A.P.I., Sec. Recovery of Oil in the U. S., Rev. ed. (In press).

Fuller, M. L., 1903, Gaines Folio, U. S. Geol. Survey, Geol. Atlas 92.

Griswold, W. T., and Munn, M. J., 1907, Geology of the Oil and Gas Fields in Steubenville, Burgettstown, and Claysville Quadrangles, Ohio, West Virginia, and Pennsylvania, U. S. Geol. Survey, Bull. 318.

Harding, Richard W., 1947, The Coryville Oil Pool, McKean County, Pennsylvania, Producers Monthly, vol. XI, no. 10, pp. 26-29.

———— 1949, Secondary Recovery In Clintonville Area, Southwestern Venango County, Pennsylvania, Producers Monthly, vol. XIII, no. 3, pp. 29-33.

Hughes, H. H., 1933, Topographic and Geologic Atlas of the Freeport Quadrangle, Pa. Geol. Survey, 4th Ser., Bull. A36.

Ingham, A. I., Tignor, E. M., and Nabors, W. M., 1949, McDonald and Adjacent Oil Fields, Allegheny and Washington Counties, Pennsylvania, Pa. Geol. Survey, 4th Ser., Bull. M29.

Johnson, Meredith E., 1928, Topographic and Geologic Atlas of the Pittsburgh Quadrangle, Pa. Geol. Survey, 4th Ser., Bull. A27.

Matteson, L. S., and Busch, D. A., 1944, Oil-bearing Sands in Southwestern Pennsylvania, Pa. Geol. Survey, 4th Ser., Special Bull. 1.

Mineral Resources of the United States, published by the U. S. Geol. Survey from 1882 to 1923.

Minerals Yearbook, published by the U. S. Bureau of Mines from 1924 to————.

Munn, M. J., 1911a, Sewickley Folio, U. S. Geol. Survey, Geol. Atlas 176.

——— 1911 b, Claysville Folio, U. S. Geol. Survey, Geol. Atlas 180.

——— 1911 c, Oil and Gas Fields of the Carnegie Quadrangle, Pennsylvania, U.S. Geol. Survey, Bull. 456.

Report on Productive Industries, Public Utilities and Miscellaneous Statistics, published periodically by the Bureau of Statistics, Pa. Dept. of Int. Affairs.

Richardson, G. B., 1932, Geology and Coal, Oil and Gas Resources of the New Kensington Quadrangle, Pennsylvania, U. S. Geol. Survey, Bull. 829.

———— 1936, Geology and Mineral Resources of the Butler and Zelienople Quadrangles, Pennsylvania, U. S. Geol. Survey, Bull. 873.

Shaw, E. W., and Munn, M. J., 1911a, Burgettstown-Carnegie Folio, U. S. Geol. Survey, Geol. Atlas 177.

——— —— ——— 1911 b, Coal, Oil and Gas of the Foxburg Quadrangle, Pennsylvania, U. S. Geol. Survey, Bull. 454.

Shaw, E. W., Lines, E. F., and Munn, M. J., 1911, Foxburg-Clarion Folio, U. S. Geol. Survey, Geol. Atlas 178.

Sherrill, R. E., and Matteson, L. S., 1939, Geology of the Oil and Gas Fields of the Hilliards Quadrangle, Pa. Geol. Survey, 4th Ser., P. R. 122.

———— —— ———— 1941, Oil and Gas Geology of the Franklin Quadrangle, Pennsylvania, Pa. Geol. Survey, 4th Ser., Bull. M24.

Sisler, J. D., Ashley, G. H., Mover, F. T., and Hickok, W. O., 1933, Contributions to Oil and Gas Geology of Western Pennsylvania, Pa. Geol. Survey, 4th Ser., Bull. M19.

Stone, R. W., 1905, Waynesburg Folio, U. S. Geol. Survey, Geol. Atlas 121.

——— 1932, Geology and Mineral Resources of Greene County, Pennsylvania, Pa. Geol. Survey, 4th Ser., Bull. C30.

White, I. C., 1878, Report of Progress in the Beaver River District of the Bituminous Coal Fields of Western Pennsylvania, Pa. 2nd Geol. Survey, Rpt. Q.

——— 1879, The Geology of Lawrence County, Pa. 2nd Geol. Survey, Rpt. QQ.

Woolsey, L. H., 1905, Beaver Folio, U. S. Geol. Survey, Geol. Atlas 134.

Anonymous 1941, Report to the Petroleum Coordinator for National Defense, on the Oil and Gas Fields in Southwest Pennsylvania, South of the Middle District Area (Unpublished).

APPENDIX A

TABLE 1.
OIL RESERVES IN ALLEGHENY COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
133	Aten	206	330 000	----	----	----	82 000
117	Bakerstown	3 745	5 250 000	130 000	130 000	1 310 000	1 310 000
124	Bellevue - Avalon	1 000	2 000 000	----	----	----	----
116	Brush Creek	3 763	7 500 000	180 000	180 000	1 880 000	1 880 000
136	Chartiers	206	371 000	----	----	----	----
121	Coraopolis - Moon	1 912	1 910 000	47 000	47 000	475 000	475 000
127	Dorseyville	1 282	2 050 000	51 000	51 000	510 000	510 000
119	Duff City	904	1 890 000	47 000	47 000	350 000	350 000
131	Ewings Mill	619	1 114 000	----	----	----	----
122	Glenfield - Mt.Nebo	714	1 370 000	9 000	9 000	63 000	63 000
126	Glenshaw	1 499	899 000	23 000	23 000	225 000	225 000
134	Imperial	1 857	3 020 000	75 000	75 000	755 000	755 000
123	Ingomar - Grubbs	503	990 000	25 000	25 000	250 000	250 000
120	Leetsdale	810	1 940 000	----	----	----	----
137	Lickskillet - Hopper	2061	3 909 000	98 000	98 000	978 000	978 000
132	McCormick	305	492 000	12 000	12 000	123 000	123 000
143	McDonald	10 946	25 160 000	534 000	2 700 000	5 334 000	13 300 000
140	McMurray	174	244 000	6 000	6 000	61 000	61 000
118	Millerstown	310	310 000	50 000	50 000	100 000	100 000
129	Milltown	4 003	4 970 000	124 000	124 000	1 243 000	1 243 000
135	Moon Run - Crafton	2 349	3 976 000	99 000	99 000	993 000	993 000
130	Neville Island	795	1 431 000	36 000	36 000	358 000	358 000
128	Rural Ridge	1 466	1 526 000	38 000	38 000	381 000	381 000
125	Sandel - Wildwood	2 760	5 600 000	138 000	138 000	1 380 000	1 380 000
139	Venice	282	677 000	17 000	17 000	169 000	169 000
138	Woodville	251	467 000	11 000	11 000	117 000	117 000
	Total	44 722	79 396 000	1 750 000	3 916 000	17 055 000	25 103 000

OIL RESERVES IN ARMSTRONG COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
76	Butter Cross Belt	6 206	17 124 000	429 000	429 000	4 282 000	4 282 000
89	Chicora	1 616	1 940 000	50 000	50 000	485 000	485 000
81	Parker	3 610	12 520 000	313 000	313 000	3 130 000	3 130 000
Total		11 432	31 584 000	792 000	792 000	7 897 000	7 897 000

OIL RESERVES IN BEAVER COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
112	Brenner	618	1 240 000	(very little)	-----	-----	310 000
109	Carson	30	60 000	1 000	5 000	9 000	12 000
114	Cookson	231	370 000	-----	-----	-----	90 000
113	Crows Run	1 678	5 030 000	126 000	126 000	1 260 000	1 260 000
115	Economy - Legionville	1 127	1 410 000	17 000	17 000	347 000	347 000
144	Florence	327	500 000	12 000	12 000	120 000	120 000
106	Harbinson Hollow	174	350 000	-----	-----	-----	-----
108	Hookstown	1 220	1 440 000	(very little)	-----	-----	-----
110	Kendall	300	360 000	5 000	20 000	45 000	45 000
105	New Galilee	729	2 120 000	23 000	23 000	230 000	230 000
111	Shannopin	3 933	7 900 000	200 000	200 000	2 000 000	2 000 000
107	Smiths Ferry	3 040	7 100 000	150 000	150 000	1 000 000	1 000 000
Total		13 407	27 880 000	534 000	553 000	5 011 000	5 414 000

Table 1 (3)

OIL RESERVES IN BUTLER COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
90	Alameda Park - Crooked Run	220	275 000	3 000	3 000	64 000	64 000
84	Annisville - Ferris	840	3 000 000	56 000	280 000	560 000	1 410 000
117	Bakerstown	1 919	2 680 000	67 000	335 000	670 000	670 000
97	Brownsdale - Meharg	3 770	8 059 000	202 000	202 000	2 015 000	2 015 000
69	Bullion - Clintonville	2 170	9 770 000	132 000	815 000	1 625 000	4 000 000
76	Butler Cross Belt	13 350	30 600 000	765 000	765 000	7 650 000	7 650 000
78	Byram	2 715	8 990 000	166 000	832 000	1 664 000	4 160 000
94	Callery - Watters	2 525	5 050 000	----	----	----	----
77	Cherry Valley	2 640	7 260 000	116 000	580 000	1 160 000	2 904 000
89	Chicora	12 400	16 880 000	422 000	422 000	4 220 000	4 220 000
100	Crider - Duncan	1 203	1 443 000	36 000	36 000	361 000	361 000
93	Evans City - Glade Run	3 269	6 270 000	262 000	262 000	2 620 000	2 620 000
101	Garvin	835	1 670 000	----	----	----	----
91	Harmony - Zelienople	940	1 100 000	----	----	----	----
83	Hooker	8 655	47 530 000	725 000	3 800 000	7 500 000	18 800 000
82	Hoover	2 000	8 000 000	100 000	650 000	1 300 000	1 300 000
98	Jefferson Center-Herman	4 365	6 984 000	175 000	175 000	1 746 000	1 746 000
92	Little Creek	6 620	18 800 000	100 000	100 000	1 000 000	1 000 000
99	Mars - Glade Mills - Valencia	3 463	5 540 000	139 000	139 000	----	----
86	Muddycreek	1 285	2 570 000	64 000	64 000	640 000	640 000
87	Oneida	1 375	2 750 000	70 000	70 000	700 000	700 000
81	Parker - Sucker Rod	9 595	56 890 000	1 020 000	5 100 000	10 200 000	28 450 000
85	Queen Junction	80	130 000	(very little)	----	25 000	25 000
95	Renfrew - McCalmont	5 367	8 862 000	223 000	223 000	2 216 000	2 216 000
79	Rosenberry	1 575	5 670 000	110 000	550 000	1 100 000	2 835 000

OIL RESERVES IN BUTLER COUNTY BY FIELDS AS OF JANUARY 1, 1947 - Continued

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
80	Shira Streak	1 360	3 850 000	60 000	320 000	640 000	1 600 000
96	Thorn Creek	1 010	5 610 000	32 000	32 000	1 403 000	1 403 000
88	Wadsworth - North Oakland	7 480	7 711 000	192 000	192 000	1 927 000	1 927 000
Total		103 026	283 944 000	5 237 000	15 947 000	53 006 000	92 716 000
Proportion of oil production 1942 to 1946 incl			753 000	75 000	753 000	753 000	753 000
Total		103 026	283 191 000	5 162 000	15 194 000	52 253 000	91 963 000

OIL RESERVES IN CLARION COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
104	Clarion - Miola	3 200	8 025 000	154 000	771 000	1 542 000	3 855 000
102	Cogley	4 275	16 510 000	331 000	1 650 000	3 305 000	8 267 000
103	Knox	15 435	52 820 000	1 051 000	5 254 000	10 508 000	26 270 000
Total at end of 1941		22 910	77 355 000	1 536 000	7 675 000	15 355 000	38 392 000
Proportion of oil production 1942 to 1946 incl.			418 000	42 000	418 000	418 000	418 000
Total		22 910	76 937 000	1 494 000	7 257 000	14 937 000	37 974 000

Table 1 (5)

OIL RESERVES IN CRAWFORD COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
49	Atlantic	500	400 000	-----	-----	-----	-----
48	Church Run	7 700	53 750 000	838 000	4 080 000	8 160 000	20 400 000
47	Dotyville	160	400 000	7 000	7 000	64 000	64 000
Total		8 360	54 550 000	845 000	4 087 000	8 224 000	20 464 000
Proportion of oil production 1942 to 1946 incl.			264 000	26 000	264 000	264 000	264 000
Total		8 360	54 286 000	819 000	3 823 000	7 960 000	20 200 000

OIL RESERVES IN ELK COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by secondary plus primary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
20	Glen Hazel	2 000	12 240 000	100 000	750 000	1 000 000	1 200 000
19	Kane	4 000	13 680 000	144 000	144 000	1 240 000	1 240 000
21	St. Marys	160	400 000	6 000	6 000	64 000	160 000
Total		6 160	26 320 000	250 000	900 000	2 304 000	2 600 000

OIL RESERVES IN FOREST COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
39	Balltown - Truemans	3 400	16 000 000	320 000	1 600 000	3 200 000	8 000 000
33	Cooper	3 000	13 000 000	254 000	1 270 000	2 540 000	6 350 000
42	Lacy (Guitonville)	127	318 000	5 000	5 000	51 000	127 000
43	Red Brush	400	640 000	2 000	2 000	160 000	160 000
41	Salmon Creek	200	480 000	10 000	48 000	96 000	240 000
40	Watson - Duhring	4 600	13 050 000	267 000	1 333 000	2 666 000	6 660 000
44	West Hickory	4 550	21 800 000	725 000	1 826 000	3 652 000	9 130 000
Total		16 277	65 288 000	1 583 000	6 084 000	12 365 000	30 667 000
Proportion of oil production 1942 to 1946 incl.			289 000	29 000	289 000	289 000	289 000
Total		16 277	64 999 000	1 554 000	5 795 000	12 076 000	30 378 000

OIL RESERVES IN GREENE COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
154	Aleppo	869	1 043 000	26 000	26 000	258 000	258 000
164	Blackshire	312	1 248 000	-----	-----	-----	312 000
156	Board Tree	1 110	1 454 000	36 000	36 000	356 000	356 000
153	Bristoria	2 650	2 765 000	69 000	69 000	692 000	692 000
161	Dunkard Creek	268	375 000	9 000	9 000	94 000	94 000
149	Fonner	801	1 121 000	28 000	28 000	280 000	280 000
158	Garrison	141	169 000	4 000	4 000	42 000	42 000
151	Grays Fork	249	498 000	13 000	13 000	125 000	125 000
159	Lantz	533	567 000	14 000	14 000	142 000	142 000
160	Mount Morris	1 095	4 380 000	110 000	110 000	1 095 000	1 095 000
157	New Freeport	2 604	3 092 000	78 000	78 000	774 000	774 000
150	Nineveh	642	901 000	23 000	23 000	225 000	225 000
155	Rutan	500	809 000	20 000	20 000	203 000	203 000
162	Tanner	418	585 000	15 000	15 000	146 000	146 000
163	Whitely Creek	482	727 000	18 000	18 000	182 000	182 000
152	Wright Run	587	704 000	18 000	18 000	176 000	176 000
Total		13 261	20 438 000	481 000	481 000	4 790 000	5 102 000

OIL RESERVES IN JEFFERSON COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
46	Clear Creek and Cather 1	310	2 620 000	42 000	42 000	420 000	1 048 000
45	Lathorp	224	560 000	9 000	9 000	90 000	224 000
Total		1 534	3 180 000	51 000	51 000	510 000	1 272 000

OIL RESERVES IN LAWRENCE COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
74	Bessemer	8 000	16 000 000	100 000	100 000	1 000 000	1 000 000
75	Slippery Rock	350	700 000	-----	-----	-----	-----
Total		8 350	16 700 000	100 000	100 000	1 000 000	1 000 000

OIL RESERVES IN McKEAN COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
5	Bradford	72 450	692 064 000	10 000 000	67 400 000	100 000 000	150 000 000
18	Burning Well	4 100	54 450 000	700 000	5 250 000	6 000 000	7 000 000
33	Cooper	2 300	16 100 000	400 000	2 000 000	4 000 000	10 000 000
8	Coryville	1 870	9 310 000	210 000	900 000	1 100 000	1 200 000
14	East Kinzua	425	1 020 000	25 000	25 000	255 000	255 000
17	Guffy	4 410	49 000 000	700 000	6 467 000	7 000 000	8 000 000
19	Kane	2 200	7 464 000	70 000	70 000	600 000	600 000
12	Klondike	2 465	7 180 000	100 000	100 000	500 000	1 000 000
9	Lewis Run	800	3 360 000	60 000	60 000	800 000	1 200 000
11	Marshburg	235	1 410 000	35 000	35 000	352 000	352 000
16	Marvin Creek	320	1 150 000	10 000	10 000	-----	-----
6	Moody Hollow	280	1 260 000	5 000	5 000	-----	-----
10	Music Mountain	668	2 765 000	90 000	816 000	900 000	1 000 000
15	Ormsby	3 000	13 500 000	310 000	2 000 000	3 100 000	4 200 000
7	Sartwell	2 655	7 965 000	300 000	300 000	-----	-----
3	Shingle House	2 160	15 660 000	50 000	2 000 000	2 700 000	4 000 000
13	West Branch	512	4 380 000	(very little)	-----	-----	-----
4	Windfall	925	6 550 000	150 000	1 020 000	1 500 000	2 000 000
Total		101 775	894 588 000	13 215 000	88 458 000	128 807 000	190 807 000

OIL RESERVES IN MERCER COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
72	Cool Spring	500	600 000	-----	-----	-----	-----
68	Raymilton	800	2 400 000	48 000	240 000	480 000	1 200 000
73	Volant	3 200	4 160 000	54 000	270 000	540 000	1 350 000
Total at end of 1941		4 500	7 160 000	102 000	510 000	1 020 000	2 550 000
Proportion of oil production 1942 to 1946 incl.			41 000	4 000	41 000	41 000	41 000
Total		4 500	7 119 000	98 000	469 000	979 000	2 509 000

OIL RESERVES IN POTTER COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
2	Hebron Center	90	240 000	(very little)	(very little)	-----	-----
3	Shingle House	4 330	31 380 000	100 000	3 500 000	5 400 000	7 000 000
Total		4 420	31 620 000	100 000	3 500 000	5 400 000	7 000 000

OIL RESERVES IN TIOGA COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
1	Gaines	450	2 190 000	15 000	15 000	-----	-----
Total		450	2 190 000	15 000	15 000	-----	-----

Table 1 (11)

OIL RESERVES IN VENANGO COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field Number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
70	Black Hill	730	4 400 000	70 000	70 000	730 000	1 820 000
51	Breedtown	1 160	2 320 000	28 000	28 000	280 000	700 000
69	Bullion - Clintonville	16 955	73 100 000	1 414 000	7 070 000	14 140 000	35 350 000
53	Cherrytree	875	5 000 000	100 000	500 000	1 000 000	2 500 000
66	Cranberry - Rockland	14 041	67 430 000	1 079 000	5 400 000	10 792 000	26 800 000
71	Emlenton - Richey Run	6 860	23 700 000	395 000	1 940 000	3 870 000	9 680 000
64	Foster - Reno	15 875	85 030 000	1 589 000	7 950 000	15 896 000	39 800 000
63	Franklin - Oak Forest	5 920	55 000 000	474 000	2 400 000	4 740 000	11 850 000
52	Hamilton Corners	1 000	4 400 000	70 000	350 000	700 000	1 750 000
65	Hampton - Strong	7 833	37 926 000	605 000	3 030 000	6 058 000	15 150 000
59	Oakland	1 100	4 450 000	78 000	390 000	780 000	1 950 000
50	Octave	1 360	13 000 000	250 000	1 250 000	2 500 000	6 000 000
60	Oil City - Rouseville	22 705	113 360 000	2 124 000	10 620 000	21 244 000	53 100 000
58	Petroleum Center - Pioneer	8 000	45 000 000	780 000	3 900 000	7 800 000	19 500 000
56	Pithole - Cashup	8 500	39 600 000	580 000	2 900 000	5 800 000	14 500 000
54	Pleasantville	23 070	82 615 000	1 250 000	6 000 000	12 500 000	30 000 000
57	Rattlesnake	3 400	12 800 000	200 000	1 000 000	2 000 000	5 000 000
68	Raymilton	1 570	4 700 000	94 000	470 000	940 000	2 350 000
55	Shamburg	5 000	25 000 000	500 000	2 500 000	5 000 000	7 500 000
67	Speechley	580	2 320 000	23 000	23 000	232 000	580 000
62	Sugar Creek - Niles	1 400	11 750 000	126 000	630 000	1 260 000	3 150 000
61	Walnut Bend	7 885	20 485 000	291 000	1 450 000	2 907 000	7 200 000
Total at end of 1941		155 819	733 386 000	12 120 000	59 871 000	121 169 000	296 230 000
Proportion of oil production 1942 to 1946 incl.			3 576 000	350 000	3 576 000	3 576 000	3 576 000
Total		155 819	729 810 000	11 770 000	56 295 000	117 593 000	292 654 000

OIL RESERVES IN WARREN COUNTY BY FIELDS AS OF JANUARY 1, 1947

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.	Possibly recoverable by secondary methods (bbls.)
34	Bull Hill	717	2 100 000	35 000	35 000	344 000	860 000
35	Cherry Grove	2 496	8 000 000	(very little)	(very little)	-----	-----
29	Clarendon	24 000	97 000 000	1 300 000	13 500 000	17 750 000	19 000 000
37	Colorado - Goodwill Hill - Grand Valley	10 750	68 720 000	1 255 000	5 260 000	10 520 000	26 300 000
33	Cooper	4 759	32 460 000	545 000	3 220 000	6 450 000	16 130 000
32	Deerlick	350	1 750 000	-----	-----	-----	-----
31	Dew Drop	586	3 000 000	-----	-----	-----	-----
26	Gartland	1 793	5 379 000	100 000	800 000	1 000 000	1 700 000
25	Glade	5 922	25 200 000	350 000	1 500 000	3 000 000	6 000 000
30	Kinzua	575	1 900 000	20 000	20 000	150 000	380 000
28	Morrison Run	2 170	6 000 000	160 000	160 000	1 300 000	1 300 000
23	North Warren	1 527	3 100 000	100 000	100 000	-----	-----
38	Selkirk	1 200	6 300 000	100 000	525 000	1 050 000	2 520 000
27	Sill Run	212	600 000	20 000	20 000	-----	-----
24	Smith Corners	70	140 000	7 000	7 000	-----	-----
36	Tidioute	5 500	30 375 000	900 000	5 000 000	9 450 000	12 000 000
22	Youngsville - Five Points	1 150	4 600 000	100 000	100 000	1 000 000	1 840 000
Total		63 777	296 624 000	4 992 000	30 247 000	52 014 000	88 030 000
Proportion of oil production 1942 to 1946 incl.			977 000	98 000	977 000	977 000	977 000
Total		63 777	295 647 000	4 894 000	29 270 000	51 037 000	87 053 000

OIL RESERVES IN WASHINGTON COUNTY BY FIELDS AS OF JANUARY 1, 1947

Table 1 (13)

Field number	Field name	Acres	Total oil in place (bbls.)	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
145	Burgettstown	2 225	3 560 000	89 000	89 000	890 000	890 000
142	Cannonsburg	1 987	3 160 000	79 000	79 000	789 000	789 000
141	Cecil and Mawhinney	294	529 000	-----	-----	-----	-----
144	Florence	3 735	5 976 000	149 000	149 000	1 494 000	1 494 000
148	Lagonda	3 256	3 527 000	89 000	89 000	881 000	881 000
143	McDonald	6 807	15 409 000	342 000	1 710 000	3 419 000	8 297 000
140	McMurray	810	1 134 000	28 000	28 000	284 000	284 000
147	Point Lookout	163	183 000	5 000	5 000	45 000	45 000
139	Venice	3 193	5 895 000	149 000	149 000	1 474 000	1 474 000
146	Washington - Taylorstown	22 543	49 176 000	1 057 000	5 295 000	10 580 000	25 240 000
Total		45 013	88 549 000	1 987 000	7 593 000	19 856 000	39 394 000

TABLE 2
SUMMARY OF COUNTY OIL RESERVES AS OF JANUARY 1, 1947

County	Acres	Total oil in place (bbls).	Recoverable by primary methods (bbls.)	Proved recoverable by primary plus secondary methods (bbls.)	Probably recoverable by secondary methods (bbls.)	Possibly recoverable by secondary methods (bbls.)
Allegheny	44 722	79 396 000	1 750 000	3 916 000	17 055 000	25 103 000
Armstrong	11 432	31 584 000	792 000	792 000	7 897 000	7 897 000
Beaver	13 407	27 880 000	534 000	553 000	5 011 000	5 414 000
Butler	103 026	283 191 000	5 162 000	15 194 000	52 253 000	91 963 000
Clarion	22 910	76 937 000	1 494 000	7 257 000	14 937 000	37 974 000
Crawford	8 360	54 286 000	819 000	3 823 000	7 960 000	20 200 000
Elk	6 160	26 320 000	250 000	900 000	2 304 000	2 600 000
Forest	16 277	64 999 000	1 554 000	5 795 000	12 076 000	30 378 000
Greene	13 261	20 438 000	481 000	481 000	4 790 000	5 102 000
Jefferson	1 534	3 180 000	51 000	51 000	510 000	1 272 000
Lawrence	8 350	16 700 000	100 000	100 000	1 000 000	1 000 000
McKean	101 775	894 588 000	13 215 000	88 458 000	128 807 000	190 807 000
Mercer	4 500	7 119 000	98 000	469 000	979 000	2 509 000
Potter	4 420	31 620 000	100 000	3 500 000	5 400 000	7 000 000
Tioga	450	2 190 000	15 000	15 000	----	----
Venango	155 819	729 810 000	11 770 000	56 295 000	117 593 000	292 654 000
Warren	63 777	295 647 000	4 894 000	29 270 000	51 037 000	87 053 000
Washington	45 013	88 549 000	1 987 000	7 593 000	19 856 000	39 394 000
Total	625 193	2 734 434 000	45 066 000	224 462 000	449 465 000	848 320 000

TABLE 3
WELLS AND CRUDE OIL PRODUCTION IN ALLEGHENY COUNTY

Year	Total wells producing	Total annual production[1] (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1889		541 092		
1890		2 707 039		
1891		10 317 258		
1892		10 196 856		
1893		5 488 792		
1894		4 559 342		
1895		3 864 111		
1896		4 380 007		
1897		2 958 540		
1898		2 301 651		
1899		1 988 754		
1900		1 706 886		
1901		1 440 967		
1902		1 376 212		
1903		1 187 496		
1904		1 008 977		
1905		918 224		
1906		902 253		
1907	Statistics not available.			
1908	Statistics not available.			
1909	1 728			
1910	1 743			
1911	1 688			
1912	1 664			
1913	1 680			
1914	1 729			
1915	1 756			
1916	1 750			
1917	1 741			
1918	1 713			
1919	Statistics not available.			
1920	Statistics not available.			
1921	1 973	598 480	303	.83
1922	1 970	574 552	292	.80
1923	1 958	561 398	287	.79
1924	1 905	467 265	246	.67
1925	1 863	453 648	244	.67
1926	1 835	422 797	230	.63
1927	1 664	406 771	245	.67
1928	1 695	375 062	221	.61
1929	1 690	349 497	207	.57
1930	1 687	326 050	193	.53
1931	1 606	293 685	183	.50
1932	1 580	250 042	158	.43
1933	1 549	254 527	164	.45
1934	1 480	275 842	186	.51
1935	1 421	267 955	189	.52
1936	1 385	273 213	197	.54

WELLS AND CRUDE OIL PRODUCTION IN ALLEGHENY COUNTY - Continued

Year	Total wells producing	Total annual production (bbls.) [1]	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1937	1 299	271 392	209	.57
1938	1 251	254 614	203	.56
1939	1 223	269 240	220	.60
1940	1 176	247 571	210	.58
1941	1 153	224 118	194	.53
1942	1 113	216 696	195	.53
1943	1 078	214 711	199	.55
1944	1 065	212 988	200	.55
1945	1 033	204 865	198	.54
1946	1 017	196 113	193	.53
1947	982	186 747	190	.52
1948	878	181 135	206	.57

1. Figures from 1889 to 1906 include the production of the McDonald pool, most of which lies in Washington County.

Table 3 (3)

WELLS AND CRUDE OIL PRODUCTION IN ARMSTRONG COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1909	171			
1910	178			
1911	179			
1912	170			
1913	168			
1914	185			
1915	184			
1916	188			
1917	205			
1918	196			
1919	Statistics not available.			
1920	Statistics not available.			
1921	197	24 807	126	.35
1922	197	24 788	126	.35
1923	203	24 266	120	.33
1924	202	21 350	106	.29
1925	201	20 093	100	.27
1926	197	19 718	100	.27
1927	198	19 420	98	.27
1928	180	18 319	102	.28
1929	222	19 564	88	.24
1930	323	34 435	106	.29
1931	254	24 788	97	.27
1932	249	23 262	94	.26
1933	261	22 576	86	.24
1934	240	20 957	87	.24
1935	236	22 211	94	.26
1936	252	21 855	87	.24
1937	251	22 157	88	.24
1938	249	21 270	85	.23
1939	248	22 136	89	.24
1940	249	22 715	91	.25
1941	249	21 543	86	.24
1942	248	20 894	84	.23
1943	246	19 988	81	.22
1944	244	18 597	76	.21
1945	252	17 003	68	.19
1946	246	16 238	66	.18
1947	252	16 453	65	.18
1948	250	15 316	61	.17

WELLS AND CRUDE OIL PRODUCTION IN BEAVER COUNTY

Year	Total wells producing	Total annual production (bbls.)[1]	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1889		631 736		
1890		1 448 139		
1891		972 223		
1892		652 372		
1893		486 093		
1894		469 410		
1895		474 676		
1896		553 000		
1897		320 326		
1898		222 976		
1899		233 304		
1900		417 619		
1901		800 688		
1902		529 934		
1903		444 097		
1904		359 282		
1905		313 323		
1906		261 144		
1907	Statistics not available.			
1908	Statistics not available.			
1909	629			
1910	613			
1911	593			
1912	609			
1913	590			
1914	663			
1915	665			
1916	694			
1917	648			
1918	652			
1919	Statistics not available.			
1920	Statistics not available.			
1921	878	125 795	143	.39
1922	892	117 914	132	.36
1923	878	109 140	124	.34
1924	879	91 973	105	.29
1925	846	83 908	99	.27
1926	865	84 296	98	.27
1927	873	81 198	94	.26
1928	869	77 153	89	.24
1929	852	71 744	84	.23
1930	807	66 112	82	.22
1931	800	58 606	73	.20
1932	783	47 999	61	.17
1933	756	43 006	57	.16
1934	732	43 499	59	.16
1935	715	42 374	59	.16
1936	684	36 669	54	.15
1937	609	38 214	63	.17

Table 3 (5)

WELLS AND CRUDE OIL PRODUCTION IN BEAVER COUNTY - Continued

Year	Total wells producing	Total [1] annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1938	576	37 695	66	.18
1939	536	35 896	67	.18
1940	499	31 597	63	.17
1941	471	30 415	65	.18
1942	436	27 571	63	.17
1943	408	24 571	60	.16
1944	410	23 628	58	.16
1945	408	21 956	54	.15
1946	386	38 362	99	.27
1947	339	18 146	54	.15
1948	327	19 393	59	.16

1. Figures from 1889 to 1906 include Beaver and Lawrence Counties.

Table 3 (6)

WELLS AND CRUDE OIL PRODUCTION IN BUTLER COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1909	5 493			
1910	5 351			
1911	5 116			
1912	5 268			
1913	5 469			
1914	5 605			
1915	5 620			
1916	5 341			
1917	5 432			
1918	5 295			
1919	Statistics not available.			
1920	Statistics not available.			
1921	5 944	874 878	147	.40
1922	6 040	825 366	136	.37
1923	6 052	781 402	129	.35
1924	6 022	735 900	122	.33
1925	6 090	846 151	139	.38
1926	6 105	689 782	112	.31
1927	5 120	677 004	132	.36
1928	5 909	646 942	109	.30
1929	5 795	679 752	117	.32
1930	5 581	606 211	108	.30
1931	5 750	564 330	98	.27
1932	5 589	526 848	94	.26
1933	5 484	482 912	88	.24
1934	5 483	466 973	85	.23
1935	5 423	467 130	86	.24
1936	5 273	457 375	87	.24
1937	5 133	450 787	88	.24
1938	5 022	446 834	89	.24
1939	4 957	431 019	87	.24
1940	4 847	408 122	84	.23
1941	4 755	368 175	78	.21
1942	4 632	338 598	73	.20
1943	4 505	312 675	69	.19
1944	4 419	296 744	67	.18
1945	4 384	278 381	64	.17
1946	4 199	278 994	67	.18
1947	4 103	267 615	65	.18
1948	3 929	256 818	65	.18

Table 3 (7)

WELLS AND CRUDE OIL PRODUCTION IN CLARION COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1909	1 598			
1910	1 595			
1911	1 792			
1912	1 749			
1913	1 751			
1914	1 904			
1915	1 965			
1916	1 980			
1917	2 008			
1918	2 041			
1919	Statistics not available.			
1920	Statistics not available.			
1921	2 437	230 044	94	.26
1922	2 474	212 206	86	.24
1923	2 514	210 914	84	.23
1924	2 513	203 685	81	.22
1925	2 543	208 807	83	.23
1926	2 243	209 965	94	.26
1927	2 699	190 365	71	.19
1928	2 445	189 740	78	.21
1929	2 539	195 665	77	.21
1930	2 567	178 839	70	.19
1931	2 554	169 345	66	.18
1932	2 495	161 592	65	.18
1933	2 460	144 053	59	.16
1934	2 380	141 515	60	.16
1935	2 366	140 002	60	.16
1936	2 349	141 123	60	.16
1937	2 307	139 089	60	.16
1938	2 275	127 971	56	.15
1939	2 190	121 401	55	.15
1940	2 152	112 020	52	.14
1941	2 122	102 617	49	.13
1942	2 070	98 295	48	.13
1943	2 037	90 439	45	.12
1944	2 010	81 236	41	.11
1945	1 942	75 145	39	.10
1946	1 962	72 527	37	.10
1947	1 907	69 605	36	.10
1948	1 838	65 422	36	.10

WELLS AND CRUDE OIL PRODUCTION IN CRAWFORD COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1909	500			
1910	507			
1911	616			
1912	597			
1913	568			
1914	680			
1915	704			
1916	717			
1917	734			
1918	712			
1919	Statistics not available.			
1920	Statistics not available.			
1921	1 036	48 298	47	.13
1922	1 058	48 406	46	.13
1923	1 081	59 024	54	.15
1924	1 113	56 613	51	.14
1925	1 287	57 637	45	.12
1926	1 356	64 523	48	.13
1927	1 354	75 235	56	.15
1928	1 362	79 482	58	.16
1929	1 309	99 614	76	.21
1930	1 283	104 759	81	.22
1931	1 281	105 237	82	.22
1932	1 232	97 589	79	.22
1933	1 208	100 483	83	.23
1934	1 433	92 904	63	.17
1935	1 523	93 388	61	.17
1936	1 493	87 353	59	.16
1937	1 478	95 194	65	.18
1938	1 323	90 290	68	.19
1939	1 310	86 774	66	.18
1940	1 289	84 199	65	.18
1941	1 275	80 192	63	.17
1942	1 222	71 084	58	.16
1943	1 222	60 019	49	.13
1944	1 226	52 011	43	.12
1945	1 202	39 222	33	.09
1946	1 041	41 669	40	.11
1947	1 091	41 908	38	.10
1948	1 096	46 032	42	.12

Table 3 (9)

WELLS AND CRUDE OIL PRODUCTION IN ELK COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1909	1 063			
1910	1 078			
1911	1 116			
1912	1 118			
1913	1 150			
1914	1 140			
1915	1 148			
1916	1 160			
1917	1 081			
1918	1 159			
1919	Statistics not available.			
1920	Statistics not available.			
1921	1 138	116 432	102	.28
1922	1 164	109 244	94	.26
1923	1 174	101 642	87	.24
1924	1 136	100 701	90	.25
1925	1 044	93 546	90	.25
1926	1 130	88 419	78	.21
1927	1 068	86 213	81	.22
1928	1 110	85 643	77	.21
1929	1 307	92 058	71	.19
1930	1 237	86 736	70	.19
1931	1 255	84 136	67	.18
1932	1 259	81 147	65	.18
1933	1 258	74 118	59	.16
1934	1 259	74 923	60	.16
1935	1 250	71 548	57	.16
1936	1 249	71 732	57	.16
1937	1 249	72 363	58	.16
1938	1 303	69 330	53	.15
1939	1 302	72 543	56	.15
1940	1 243	76 577	62	.17
1941	1 245	88 912	71	.19
1942	1 241	72 594	58	.16
1943	1 240	62 163	50	.14
1944	1 239	68 291	55	.15
1945	718	36 945	52	.14
1946	711	38 140	54	.15
1947	701	38 496	55	.15
1948	711	35 121	49	.13

Table 3 (10)

WELLS AND CRUDE OIL PRODUCTION IN FOREST COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1909	1 512			
1910	1 501			
1911	1 633			
1912	1 612			
1913	1 662			
1914	1 692			
1915	1 609			
1916	1 626			
1917	1 621			
1918	1 698			
1919	Statistics not available.			
1920	Statistics not available.			
1921	1 628	96 033	59	.16
1922	1 652	87 226	53	.15
1923	1 746	82 707	48	.13
1924	1 676	87 369	52	.14
1925	1 678	131 162	78	.21
1926	2 094	137 078	66	.18
1927	2 220	127 814	58	.16
1928	2 150	160 577	75	.21
1929	1 684	102 017	61	.17
1930	1 521	103 271	68	.19
1931	1 517	93 290	62	.17
1932	1 516	94 338	62	.17
1933	1 537	93 239	61	.17
1934	1 639	90 296	55	.15
1935	1 563	94 488	61	.17
1936	1 477	95 263	65	.18
1937	1 499	97 340	65	.18
1938	1 490	95 377	64	.18
1939	1 472	91 395	62	.17
1940	1 448	81 209	56	.15
1941	1 461	73 432	50	.14
1942	1 370	68 441	50	.14
1943	1 406	63 143	45	.12
1944	1 406	60 176	43	.12
1945	1 339	60 210	45	.12
1946	1 281	37 203	29	.08
1947	1 272	69 347	54	.15
1948	1 240	37 602	30	.08

Table 3 (11)

WELLS AND CRUDE OIL PRODUCTION IN GREENE COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1888		93 034		
1889		392 912		
1890		956 030		
1891		341 813		
1892		102 108		
1893		74 377		
1894		64 176		
1895		116 931		
1896		94 796		
1897		258 065		
1898		325 177		
1899		381 483		
1900		558 379		
1901		771 708		
1902		721 574		
1903		567 999		
1904		541 356		
1905		473 810		
1906		390 505		
1907	Statistics not available.			
1908	Statistics not available.			
1909	433			
1910	428			
1911	484			
1912	496			
1913	507			
1914	515			
1915	510			
1916	519			
1917	522			
1918	544			
1919	Statistics not available.			
1920	Statistics not available.			
1921	746	413 163	554	1.52
1922	752	317 343	422	1.15
1923	730	274 229	376	1.03
1924	747	249 871	335	.92
1925	763	302 938	397	1.09
1926	704	439 576	604	1.65
1927	742	370 612	499	1.37
1928	750	228 199	304	.83
1929	770	276 263	359	.98
1930	770	244 495	317	.87
1931	766	207 349	271	.74
1932	760	171 948	225	.62
1933	754	169 324	225	.62
1934	732	190 969	262	.72
1935	720	192 730	267	.73

Table 3 (12)

WELLS AND CRUDE OIL PRODUCTION IN GREENE COUNTY - Continued

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1936	697	209 957	302	.83
1937	742	265 017	357	.98
1938	737	242 266	329	.90
1939	730	213 211	276	.76
1940	704	180 879	256	.70
1941	686	163 871	239	.65
1942	681	152 389	224	.61
1943	665	129 178	195	.53
1944	701	116 313	166	.45
1945	696	110 432	159	.43
1946	685	107 556	157	.43
1947	629	101 021	161	.44
1948	591	95 076	161	.44

Table 3 (13)

WELLS AND CRUDE OIL PRODUCTION IN JEFFERSON COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1909	125			
1910	126			
1911	131			
1912	135			
1913	142			
1914	153			
1915	150			
1916	152			
1917	155			
1918	164			
1919	Statistics not available.			
1920	Statistics not available.			
1921	163	13 210	81	.22
1922	163	10 036	62	.17
1923	163	9 237	57	.16
1924	162	8 436	52	.14
1925	162	8 527	53	.14
1926	558	21 167	38	.10
1927	159	7 687	48	.13
1928	156	6 744	43	.12
1929	158	5 966	38	.10
1930	157	6 187	39	.11
1931	157	6 344	40	.11
1932	149	5 462	37	.10
1933	147	4 832	33	.09
1934	146	6 556	45	.12
1935	139	7 063	51	.14
1936	139	6 787	49	.13
1937	140	7 253	52	.14
1938	141	6 947	49	.13
1939	140	5 572	40	.11
1940	141	5 500	39	.11
1941	143	5 830	41	.11
1942	139	5 646	41	.11
1943	138	5 387	39	.11
1944	134	4 987	37	.10
1945	134	4 840	36	.10
1946	133	5 104	39	.11
1947	103	4 907	48	.13
1948	105	6 070	58	.16

Table 3 (14)

WELLS AND CRUDE OIL PRODUCTION IN LAWRENCE COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1909	9			
1910	22			
1911	68			
1912	178			
1913	918			
1914	1 139			
1915	1 002			
1916	1 022			
1917	944			
1918	855			
1919	Statistics not available.			
1920	Statistics not available.			
1921	370	31 736	86	.24
1922	385	31 825	83	.23
1923	554	28 654	52	.14
1924	484	24 215	50	.14
1925	489	22 537	46	.13
1926	800	19 348	24	.07
1927	798	27 319	34	.09
1928	491	24 921	51	.14
1929	770	21 435	28	.08
1930	806	31 044	39	.11
1931	510	23 029	45	.12
1932	753	20 580	27	.07
1933	779	18 092	23	.06
1934	704	17 668	25	.07
1935	634	14 915	24	.06
1936	603	13 216	22	.06
1937	541	12 342	23	.06
1938	536	12 090	23	.06
1939	522	13 604	26	.07
1940	445	11 860	27	.07
1941	308	7 511	24	.07
1942	254	5 049	20	.05
1943		833		

Table 3 (15)

WELLS AND CRUDE OIL PRODUCTION IN McKEAN COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1909	14 571			
1910	14 609			
1911	15 055			
1912	14 970			
1913	15 055			
1914	15 376			
1915	15 604			
1916	15 794			
1917	15 985			
1918	16 216			
1919	Statistics not available.			
1920	Statistics not available.			
1921	20 612	2 311 662	112	.31
1922	20 882	2 466 723	118	.32
1923	18 590	2 490 696	134	.37
1924	17 587	2 374 775	135	.37
1925	17 262	2 575 089	149	.41
1926	26 447	2 962 698	112	.31
1927	26 286	5 535 157	210	.58
1928	26 587	5 901 394	222	.61
1929	30 036	7 734 945	258	.71
1930	29 851	9 268 679	310	.85
1931	28 803	8 385 975	291	.80
1932	29 518	8 991 026	304	.83
1933	31 161	9 466 346	304	.83
1934	32 730	11 041 106	338	.93
1935	31 893	12 813 267	402	1.10
1936	33 382	13 871 170	415	1.14
1937	34 141	16 454 744	482	1.32
1938	32 874	14 146 004	430	1.18
1939	33 590	14 060 287	419	1.15
1940	33 272	14 311 091	430	1.18
1941	34 202	13 886 828	406	1.11
1942	34 759	15 021 457	433	1.18
1943	35 059	13 154 544	375	1.03
1944	37 480	12 235 519	326	.89
1945	35 390	10 825 610	306	.84
1946	35 962	11 124 764	310	.85
1947	36 048	10 762 322	299	.82
1948	36 142	10 689 895	296	.81

Table 3 (16)

WELLS AND CRUDE OIL PRODUCTION IN MERCER COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1909	267			
1910	271			
1911	266			
1912	276			
1913	275			
1914	278			
1915	326			
1916	332			
1917	345			
1918	229			
1919	Statistics not available.			
1920	Statistics not available.			
1921	325	14 795	46	.13
1922	324	12 954	40	.11
1923	364	13 643	38	.10
1924	363	13 503	37	.10
1925	369	13 804	37	.10
1926	369	14 401	39	.11
1927	373	14 031	38	.10
1928	375	15 489	41	.11
1929	627	22 022	35	.10
1930	380	16 070	42	.12
1931	381	14 437	38	.10
1932	380	13 745	36	.10
1933	381	13 596	36	.10
1934	331	12 383	37	.10
1935	334	12 484	37	.10
1936	332	10 595	32	.09
1937	296	11 018	37	.10
1938	303	10 129	34	.09
1939	296	9 886	33	.09
1940	287	8 422	29	.08
1941	284	8 892	31	.09
1942	247	9 061	37	.10
1943	247	8 567	34	.09
1944	247	8 014	33	.09
1945	247	7 673	31	.09
1946	248	7 230	29	.08
1947	247	7 237	29	.08
1948	247	7 163	29	.08

Table 3 (17)

WELLS AND CRUDE OIL PRODUCTION IN POTTER COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1909	159			
1910	159			
1911	85			
1912	78			
1913	92			
1914	92			
1915	92			
1916	84			
1917	73			
1918	73			
1919	Statistics not available.			
1920	Statistics not available.			
1921	271	13 612	50	.14
1922	270	13 375	50	.14
1923	270	12 135	45	.12
1924	240	10 011	42	.11
1925	252	11 686	46	.13
1926	234	7 395	32	.09
1927	233	6 860	29	.08
1928	251	8 849	35	.10
1929	261	3 122	12	.03
1930	292	5 863	20	.06
1931	231	6 206	27	.07
1932	276	7 500	27	.07
1933	251	8 345	33	.09
1934	251	9 205	37	.10
1935	254	11 031	43	.12
1936	248	11 031	44	.12
1937	246	10 124	41	.11
1938	238	9 963	42	.11
1939	246	10 287	42	.11
1940	246	10 238	42	.11
1941	243	32 978	136	.37
1942	231	48 634	211	.58
1943	232	60 921	262	.72
1944	224	46 684	208	.57
1945	206	30 535	148	.41
1946	215	28 692	133	.37
1947	256	40 592	159	.44
1948	303	46 726	154	.42

WELLS AND CRUDE OIL PRODUCTION IN TIOGA COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1900		115 104		
1901		37 491		
1902		24 881		
1903		19 553		
1904		15 904		
1905		12 674		
1906		10 244		
1907	Statistics not available.			
1908	Statistics not available.			
1909	45			
1910	41			
1911	26			
1912	7			
1913	24			
1914	24			
1915	24			
1916	24			
1917	24			
1918	29			
1919	Statistics not available.			
1920	Statistics not available.			
1921	80	10 095	126	.35
1922	80	8 779	110	.30
1923	80	7 712	96	.26
1924	80	6 836	86	.23
1925	80	5 916	74	.20
1926	16	2 411	153	.42
1927 to 1944	Statistics not available.			
1945	50	4 658	93	.25
1946	Statistics not available.			
1947	50	2 750	55	.15
1948	50	3 093	62	.17

Table 3 (19)

WELLS AND CRUDE OIL PRODUCTION IN VENANGO COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average dail production per well (bbls.)
1909	13 877			
1910	13 989			
1911	15 199			
1912	15 552			
1913	16 640			
1914	18 104			
1915	17 895			
1916	17 735			
1917	17 918			
1918	18 117			
1919	Statistics not available.			
1920	Statistics not available.			
1921	26 875	1 454 528	54	.15
1922	26 940	1 360 093	50	.14
1923	25 900	1 304 206	50	.14
1924	25 981	1 236 568	47	.13
1925	26 466	1 184 221	45	.12
1926	26 933	1 161 924	43	.12
1927	27 304	1 214 568	44	.12
1928	26 017	1 147 047	44	.12
1929	26 180	1 291 487	49	.14
1930	26 076	1 132 969	44	.12
1931	25 942	1 083 989	42	.11
1932	25 510	1 027 450	40	.11
1933	24 657	946 342	38	.11
1934	23 479	902 195	38	.11
1935	24 107	917 189	38	.11
1936	23 994	908 313	38	.11
1937	23 705	965 446	41	.11
1938	24 414	1 039 506	43	.12
1939	24 276	977 752	40	.11
1940	24 059	945 951	39	.11
1941	23 614	920 594	39	.11
1942	23 557	834 836	35	.10
1943	23 136	758 778	33	.09
1944	23 017	703 252	31	.08
1945	23 079	621 145	27	.07
1946	22 511	657 716	29	.08
1947	22 435	664 473	30	.08
1948	21 791	627 955	29	.08

Table 3 (20)

WELLS AND CRUDE OIL PRODUCTION IN WARREN COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1909	6 308			
1910	6 312			
1911	6 906			
1912	6 899			
1913	6 941			
1914	7 233			
1915	7 339			
1916	7 474			
1917	7 470			
1918	7 345			
1919	Statistics not available.			
1920	Statistics not available.			
1921	7 053	342 640	49	.13
1922	7 303	516 781	71	.19
1923	7 015	522 107	75	.21
1924	6 929	326 852	47	.13
1925	6 842	294 597	43	.12
1926	5 407	313 808	58	.16
1927	6 009	343 315	57	.16
1928	5 925	299 282	50	.14
1929	5 990	315 322	53	.14
1930	5 950	317 025	53	.14
1931	6 310	303 078	48	.13
1932	6 382	307 616	48	.13
1933	6 388	300 687	47	.13
1934	7 715	421 255	55	.15
1935	7 630	290 826	38	.10
1936	7 721	465 196	60	.16
1937	7 853	615 732	78	.21
1938	7 907	582 552	74	.20
1939	8 033	521 791	65	.18
1940	8 267	504 416	61	.17
1941	8 320	536 940	65	.18
1942	8 586	515 253	59	.16
1943	8 673	500 491	58	.16
1944	7 731	378 575	52	.14
1945	7 683	246 233	32	.09
1946	7 647	313 977	41	.11
1947	9 140	391 007	43	.12
1948	9 353	506 849	54	.15

Table 3 (21)

WELLS AND CRUDE OIL PRODUCTION IN WASHINGTON COUNTY

Year	Total wells producing	Total[1] annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1886		3 189 822		
1887		2 859 344		
1888		2 322 190		
1889		3 848 145		
1890		3 900 487		
1891		2 997 278		
1892		2 452 388		
1893		2 077 564		
1894		1 720 780		
1895		1 676 676		
1896		1 975 169		
1897		2 175 712		
1898		1 742 677		
1899		1 460 036		
1900		1 375 341		
1901		1 300 399		
1902		1 396 831		
1903		1 199 838		
1904		1 149 847		
1905		1 149 536		
1906		1 287 714		
1907	Statistics not available.			
1908	Statistics not available.			
1909	1 822			
1910	1 765			
1911	1 792			
1912	1 728			
1913	1 662			
1914	1 818			
1915	1 850			
1916	1 855			
1917	1 830			
1918	1 825			
1919	Statistics not available.			
1920	Statistics not available.			
1921	2 005	531 117	266	.73
1922	1 972	499 893	253	.70
1923	1 983	474 765	239	.66
1924	1 906	478 483	251	.69
1925	1 879	455 554	233	.67
1926	1 836	449 493	245	.68
1927	1 821	455 807	251	.69
1928	1 789	500 019	280	.77
1929	1 800	490 142	272	.75
1930	1 819	476 964	262	.73
1931	1 764	420 333	238	.65

WELLS AND CRUDE OIL PRODUCTION IN WASHINGTON COUNTY - Continued

Year	Total wells producing	Total [1] annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1932	1 758	380 249	217	.59
1933	1 746	416 709	238	.65
1934	1 755	507 681	288	.79
1935	1 734	479 888	277	.76
1936	1 729	455 652	261	.72
1937	1 699	462 580	273	.75
1938	1 670	432 978	259	.71
1939	1 656	412 947	251	.69
1940	1 622	392 219	241	.66
1941	1 578	366 460	232	.64
1942	1 494	335 078	224	.62
1943	1 469	306 296	208	.57
1944	1 460	283 434	194	.53
1945	1 453	269 005	178	.49
1946	1 451	296 990	205	.56
1947	1 422	293 266	206	.56
1948	1 264	270 141	214	.59

1. In 1886 and 1887, the production includes Greene and Washington Counties. From 1889 to 1906 the production represents Washington County with the exception of the McDonald pool which is included in Allegheny County.

Table 3 (23)

WELLS AND CRUDE OIL PRODUCTION IN FAYETTE AND WESTMORELAND COUNTIES

FAYETTE COUNTY

Year	Total wells producing	Total annual production (bbls.)	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1929	3	1 721	574	1.57

WESTMORELAND COUNTY

1921	1	150	150	.41
1922	1	233	233	.64
1923	1	215	215	.59
1924	1	257	257	.70
1925	1	186	186	.51
1931		374 *		
1932		172		
1933		302		
1934		202		
1935		165		
1936		104		
1937		78		
1938		87		
1940		41		

* The production from 1931 to 1940 inclusive was pumped from gas wells.

TABLE 4

WELLS AND CRUDE OIL PRODUCTION IN PENNSYLVANIA

Year	Approximate number of producing oil wells Dec. 31 [1]	Total annual production (bbls.) [1]	Average annual production per well (bbls.)	Average daily production per well (bbls.)
1859		2 000		
1860		500 000		
1861		2 114 000		
1862		3 057 000 f		
1863		2 611 000		
1864		2 116 000		
1865		2 498 000		
1866		3 598 000		
1867		3 347 000		
1868		3 646 000		
1869		4 215 000		
1870		5 261 000		
1871		5 205 000		
1872	4 205	6 293 000	1 495	4.10
1873	4 109	9 894 000	2 410	6.60
1874	3 276	10 927 000	3 341	9.15
1875	3 098	8 788 000	2 840	7.78
1876	4 694	8 969 000	1 920	5.24
1877	7 383	13 135 000	1 780	4.88
1878	9 561	15 164 000	1 586	4.44
1879	11 283	19 685 000	1 745	4.78
1880	13 234	26 028 000 b	1 965	5.38
1881	16 668	27 376 000 b	1 641	4.50
1882	19 027	23 368 000	1 227	3.36
1883	17 918	19 125 000	1 068	2.92
1884	21 531	20 541 000	955	2.62
1885	22 545	18 118 000	806	2.21
1886	24 727 a	23 647 000	957	2.62
1887		20 281 000		
1888	25 420 b	16 489 000 b	648	1.78
1889	31 768 b	19 591 000	677	1.69
1890		28 458 000 b		
1891		31 424 000		
1892		27 149 000		
1893		19 283 000		
1894		18 078 000		
1895		18 231 000		
1896		19 379 000		
1897		17 983 000		
1898		14 743 000		
1899		13 054 000		
1900		13 258 000		
1901		12 625 000		
1902	37 806 c	12 064 000	318	.87
1903		11 355 000		
1904		11 126 000		
1905		10 437 000		
1906		10 257 000		
1907		10 000 000		

Table 4 (2)

WELLS AND CRUDE OIL PRODUCTION IN PENNSYLVANIA - Continued

Year	Approximate number of producing oil wells Dec. 31 [1]	Total annual production (bbls.) [1]	Average annual production per well (bbls.)	Average dail production per well (bbls.)
1908	49 043	9 424 000	192	.53
1909	50 310	9 299 000	185	.51
1910	50 991	8 795 000	173	.47
1911	52 745	8 248 000	156	.43
1912	53 106	7 838 000	148	.40
1913	55 294	7 917 000	143	.39
1914	58 330	8 170 000	140	.38
1915	58 443	7 839 000	134	.37
1916	58 447	7 593 000	130	.36
1917	58 852	7 733 000	131	.36
1918	58 893	7 408 000	126	.34
1919	77 325 d	8 137 000	105	.29
1920	67 700 e	7 438 000	110	.30
1921	73 700	7 418 000	101	.28
1922	75 000	7 425 000	99	.27
1923	74 000	7 609 000	103	.28
1924	74 350	7 486 000	101	.28
1925	75 900	8 097 000	107	.29
1926	76 800	8 961 000	117	.32
1927	78 480	9 526 000	121	.33
1928	78 600	9 956 000	127	.35
1929	80 320	11 820 000	147	.40
1930	80 560 h	12 803 000	159	.45
1931	79 930 h	11 892 000	149	.41
1932	80 189 h	12 412 000	155	.42
1933	80 777 j	12 624 000	156	.43
1934	82 489 h	14 478 000	176	.48
1935	81 942 h	15 810 000	193	.53
1936	83 007 h	17 070 000	206	.56
1937	83 188 h	19 155 000	230	.63
1938	82 309 g	17 426 000	212	.58
1939	83 124 g	17 382 000	209	.57
1940	81 664 g	17 353 000	212	.58
1941	82 008 g	16 750 000	204	.56
1942	82 280 g	17 779 000	216	.59
1943	81 761 g	15 757 000	193	.53
1944	79 500 g	14 118 000	178	.49
1945	81 050 g	12 515 000	154	.42
1946	79 967 g	12 996 000	163	.45
1947	81 188 g	12 976 000 g	160	.44
1948	80 257 g	12 910 000 g	161	.44

1. Figures from Mineral Resources of the United States by U.S. Geol. Survey and fr Minerals Yearbook by the U.S. Bureau of Mines unless otherwise indicated.

a. Prior to and including 1886 the figures represent the average monthly number o producing wells in Pennsylvania and New York.

WELLS AND CRUDE OIL PRODUCTION IN PENNSYLVANIA - Continued

). New York included with Pennsylvania.

:. Data from Twelfth Census Report.

i. Producing oil and gas wells combined. Figures from Fourteenth Census Report, ?ol. XI.

e. Producing oil wells from Petroleum in United States and Possessions by Arnold and Kemnitzer.

f. In addition, it is estimated that, for want of a market, 10,000,000 barrels ran to waste in and prior to 1862 from Pennsylvania fields.

g. Data from Report on Productive Industries, Public Utilities and Miscellaneous Statistics by Pa. Dept. of Int. Affairs.

h. Producing oil wells from Oil and Gas Journal.

j. Producing oil wells from Oil Weekly.

Table 5. Yearly and total crude oil production in Pennsylvania by districts from 1859 to 1885 inclusive. (from Bull. M19, Pa. Geol. Surv., 4th Ser. pp. 58–59, 1933)

(Units of thousands of barrels)*

Year	Oil Creek [1]	Central [2] Allegheny	Tidioute [3] and Fagundus	Beaver [4] and Smiths Ferry	Pithole [5] and Casnup	Butler [6] and Armstrong	Clarion [7]	Bradford [8]	Warren [9] and Forest	Bullion [10]	Total
1859	2										2
1860	120	75	5								200
1861	1,870	170	50	20							2,110
1862	2,860	125	40	30							3,055
1863	2,480	80	30	20							2,610
1864	2,000	85	30	15							2,130
1865	1,600	100	100	20	900	1					2,721
1866	2,000	200	600	25	900	5	2				3,732
1867	1,950	200	850	20	550	8	5				3,583
1868	2,300	300	750	20	300	25	20	1			3,716
1869	3,000	350	800	20	100	45	35	1			4,351
1870	2,900	400	1,000	20	75	900	75	1			5,371
1871	2,200	800	1,000	20	100	1,100	310	1			5,531
1872	1,700	800	1,100	25	200	1,700	830	2			6,357
1873	1,200	800	900	30	100	4,400	2,500	2			9,932
1874	800	500	400	30	50	5,200	3,900	3			10,883
1875	550	400	350	35	40	4,650	2,750	25	1		8,801
1876	650	350	350	35	30	4,700	2,400	380	55	65	9,015
1877	800	450	310	62	15	5,500	3,000	1,450	150	1,306	13,043
1878	750	350	300	92	10	4,500	2,250	6,500	110	505	15,367
1879	500	250	250	82	5	2,800	1,400	14,200	50	290	19,827
1880	400	170	230	103	3	1,700	900	22,300	90	147	26,043
1881	350	150	220	100		1,400	850	23,000	440	128	26,638
1882	280	155	195	80		1,300	600	18,000	3,300	100	24,010
Total	33,262	7,260	9,860	904	3,378	39,934	21,827	85,866	4,196	2,541	209,028

Year	Venango [11] and Butler (proper)	Baldridge [12] and Thorn Creek	Cogley Run [13]	Warren [14] and Clarendon	Cherry [14] Grove	Cooper [14]	Balltown [14]	Wardwell [14]	Bradford [8]	Total
1882 [8]	118,966			1,818	2,345	30	3		85,866	209,028
1883	2,700			873	756	1,096	776		13,400	19,600
1884	2,687	963		1,221	265	1,005	808	701	12,000	19,650
1885	2,786	1,813	701	1,426	136	341	348	149	10,600	18,300
Total	127,139	2,776	701	5,338	3,502	2,472	1,935	850	121,866	266,578

[1] Includes Oil Creek Valley and borders, Cherry Run, Keech Farm, West Pithole, Pleasantville and surroundings, Enterprise, Shamburg, Octave, Titusville and Church Run pools in north central Venango County.
[2] Includes Allegheny River from Scrubgrass to East Hickory including East Sandy, Bully Hill, Franklin, Reno, Slate Run, Walnut Bend, Henrys' Bend, and mouth of West Hickory pools, in east and west central and central Venango County.
[3] Includes Tidioute, Economy, Dennis Run, Triumph, New London, Colorado, and Fagundus pools in western Forest and southwestern Warren counties.
[4] Includes Smith's Ferry, Ohioville and Slippery Rock pools in Beaver and Lawrence counties.
[5] Includes Holmden, Morey, Ball and Rooker farms, and the Cashup pool in Northeastern Venango County.
[6] Embracing all the oil territory in these two counties.
[7] Includes Foxburg, Richey Run, Emienton, St. Petersburg, Edenburg, and Shippensville pools.
[8] The Northern Oil Fields of McKean County, Pennsylvania and Cattaraugus County, New York.
[9] Includes Warren, Stoncham, Clarendon, Cherry Grove, and Sheffield pools in Warren County and Balltown, Blue Jay, and Cooper districts in Forest County.
[10] Includes Bullion Run and its surroundings in southwestern Venango County.
[11] Includes the following districts—Oil Creek, Central Allegheny, Tidioute and Fagundus, Beaver and Smith's Ferry, Pithole and Cashup, Butler and Armstrong, Clarion and Bullion.
[12] A new pool in central Butler County.
[13] A new pool in northwestern Clarion County.
[14] Since 1881, the production of the Warren and Forest District has been subdivided into the following districts; Warren and Clarendon, Cherry Grove, Cooper, Balltown and Wardwell.
[a] Figures opposite 1882 indicate the total production up to the end of 1882.
[*] Reference:—Statistical Chart No. 1, Annual Report 1886, part 2, Second Pennsylvania Geological Survey.

Table 6. Crude oil production in Pennsylvania by counties and districts.
(from Bull. M19, Pa. Geol. Surv., 4th Ser., pp. 60–62, 1933)

Year	Allegheny [1] County (bbls.)	Armstrong County (bbls.)	Beaver [2] County (bbls.)	Bradford [3] District (bbls.)	Butler County (bbls.)	Clarendon [4] and Warren Dist. (bbls.)
1875				36,000*[d]		
1876				382,768*		
1877				1,468,451*		
1878				6,197,746*		
1879				14,084,120*		
1880				20,138,091*		
1881				25,846,261*		
1882				18,625,980*		
1883				13,436,426*		
1884				12,096,950*		
1885				8,441,501		
1886				7,043,617		
1887				7,563,432		
1888				6,284,375[e]		
1889	541,092		631,736	7,158,363[e]		
1890	2,707,039†		1,448,139†	6,269,727†		266,452†
1891	10,317,258		972,223	5,452,418		360,227
1892	10,196,856		652,372	4,291,061		272,523
1893	5,488,792		486,093	3,502,136		327,680
1894	4,559,342		469,410	3,359,835		338,570
1895	3,864,111		474,676	3,244,808		369,747
1896	4,380,007		553,000	3,604,771		385,294
1897	2,958,540		320,326	3,904,230		378,075
1898	2,301,651		222,976	3,444,299		414,212
1899	1,988,754		233,304	3,206,845		414,352
1900	1,706,886		417,619	3,022,493		383,493
1901	1,440,967		800,688	2,757,603		404,433
1902	1,376,212		529,934	2,506,981		468,420
1903	1,187,496		444,097	2,326,413		514,675
1904	1,008,977		359,282	2,187,883		520,925
1905	918,224		313,323	2,115,225		433,667
1906	902,253		261,144	1,922,501		458,533
1921 [a]	598,480	24,807	125,795		874,878	
1922	574,552	24,788	117,914		825,366	
1923	561,398	24,266	109,140		781,402	
1924	467,265	21,350	91,973		735,900	
1925	453,648	20,093	83,908		846,151	
1926	422,797	19,718	84,296		689,782	
1927	406,771	19,420	81,198		677,004	
1928	375,062	18,319	77,153		646,942	
1929 [b]	349,497	19,564	71,744		679,752	
1930	326,050	34,435	66,112		606,211	
1931'	293,685	24,788	58,606		564,330	

Year	Clarion County (bbls.)	Crawford County (bbls.)	Elk County (bbls.)	Forest County (bbls.)	Franklin [5] District (bbls.)	Greene County (bbls.)
1888						93,034
1889					65,276	392,912
1890						956,030†
1891					65,185	341,813
1892					58,459	102,108
1893					66,278	74,377
1894					57,070	64,176
1895					48,711	116,931
1896					49,329	94,796
1897					48,880	258,065
1898					56,090	325,177
1899					61,085	381,483
1900					59,036	558,379
1901					55,162	771,708
1902					50,555	721,574
1903					48,209	567,999
1904					48,499	541,356
1905					44,118	473,810
1906					44,412	390,505
1921 [a]	230,044	48,298	116,432	96,033		413,163
1922	212,206	48,406	109,244	87,226		317,343
1923	210,914	59,024	101,642	82,707		274,229
1924	203,685	56,613	100,701	87,369		249,871
1925	208,807	57,637	93,546	131,162		302,938
1926	209,965	64,523	88,419	137,078		439,576
1927	190,365	75,235	86,213	127,814		370,612
1928	189,740	79,482	85,643	160,577		228,199
1929 [b]	195,665	99,614	92,058	102,017		276,263
1930	178,839	104,759	86,736	103,271		244,495
1931	169 345	105.237	84.136	93.290		207.349

[1] Figures from 1889 to 1906 include the production of the McDonald pool, most of which lies in Washington County.
[2] From 1889 to 1906 includes Beaver and Lawrence counties.
[3] Includes northern and central parts of McKean County, Pennsylvania and extends 6 miles into southeastern Cattaraugus County, New York.
[4] Includes pools in the vicinity of Clarendon and Warren in central Warren County.
[5] Premium lubricating oil from the immediate vicinity of Franklin, Venango County.
[6] Includes western Forest, southwestern Warren, Crawford, Venango, Butler and Armstrong counties.

Year	Jefferson County (bbls.)	Lawrence County (bbls.)	Lower [g] District (bbls.)	McKean County (bbls.)	Mercer County (bbls.)	Middle [g] District (bbls.)
1885			7,245,911			2,430,618
1886			9,857,059			3,908,197
1887			9,167,819			1,115,498
1888			5,715,452			2,069,616
1889			6,243,522			2,606,389
1890			8,919,942†			2,103,001†
1891			9,091,970			1,735,560
1892			7,738,878			1,273,421
1893			5,867,522			1,303,767
1894			6,259,723			1,215,628
1895			7,215,356			1,170,392
1896			7,539,807			956,390
1897			6,825,599			1,329,448
1898			5,500,433			932,000
1899			5,080,182			528,440
1900			5,364,398			452,136
1901			4,855,049			176,185
1902			4,754,979			162,762
1903			4,794,520			
1904			4,859,954			
1905			4,577,775			
1906			4,735,004			
1921 [a]	13,210	31,736		2,311,662	14,795	
1922	10,036	31,825		2,466,723	12,954	
1923	9,237	28,654		2,490,696	13,643	
1924	8,436	24,215		2,374,775	13,503	
1925	8,527	22,537		2,575,089	13,804	
1926	21,167	19,348		2,962,698	14,401	
1927	7,687	27,319		5,535,157	14,031	
1928	6,744	24,921		5,901,394	15,489	
1929 [b]	5,966	21,435		7,734,945	22,022	
1930	6,187	31,044		9,268,679	16,070	
1931	6,344	23,029		8,385,975	14,437	

Year	Potter County (bbls.)	Tioga County (bbls.)	Tiona District (bbls.)	Venango County (bbls.)	Warren County (bbls.)	Washington County (bbls.)	Westmoreland County (bbls.)
1886						3,189,822	
1887						2,859,344	
1888						2,322,190	
1889						3,848,145	
1890			667,928†			3,900,487†	
1891			553,730			2,997,278	
1892			475,708			2,452,388	
1893			286,595			2,077,564	
1894			318,611			1,720,780	
1895			325,843			1,676,676	
1896			309,252			1,975,169	
1897			291,585			2,175,712	
1898			251,447			1,742,677	
1899			212,217			1,460,036	
1900		115,105	256,915			1,375,341	
1901		37,491	466,909			1,300,399	
1902		24,881	421,728			1,396,831	
1903		19,553	578,122			1,199,838	
1904		15,904	608,165			1,149,847	
1905		12,674	568,061			1,149,536	
1906		10,244	515,824			1,287,714	
1921 [a]	13,612	10,096		1,454,528	342,640	531,117	150
1922	13,375	8,779		1,360,093	516,781	499,893	233
1923	12,135	7,712		1,304,206	522,107	474,765	215
1924	10,011	6,836		1,236,568	326,852	478,483	257
1925	11,686	5,916		1,184,221	294,597	455,554	186
1926	7,395	2,411		1,161,924	313,808	449,493	
1927	6,860			1,214,568	343,315	455,807	
1928	8,849			1,147,047	299,282	500,019	
1929 [b]	3,122			1,291,487	315,322	490,142	
1930	5,863			1,132,969	317,025	476,964	
1931	6,206			1,083,989	303,078	420,333	374[e]

[f] Includes production from eastern Warren, northeastern Forest, southwestern McKean and Elk counties, with the exception of the Tiona, and Clarendon and Warren districts, for which the production is given separately.

[g] Pools in the vicinity of Tiona in central Warren County.

[h] In 1886 and 1887, the production includes Greene and Washington counties. From 1889 to 1906, the production represents Washington County with the exception of the McDonald pool which is included in Allegheny County.

[a] All county production figures from 1921 on represent crude oil produced within the county limits. Figures from Productive Industries, Pennsylvania. Department of Internal Affairs.

[b] Fayette County produced 1,721 barrels in 1929 and is included in the total for the year.

[c] Bradford District and Allegany County, N. Y. production combined. The Oil City Derrick separation of the two districts is:

	Bradford	Allegany, N. Y.
1888	5,121,025 bbls.	1,177,950 bbls.
1889	6,008,737 "	1,206,613 "

[d] Figures for production of Bradford District from 1868 to 1875 inclusive.

[e] Pumped from gas wells.

[*] Oil City Derrick's Handbook of Petroleum.

† Pennsylvania Department of Internal Affairs, Petroleum Industry of Pennsylvania.

TABLE 7
PRODUCTION AND VALUE OF CRUDE OIL IN PENNSYLVANIA AND THE UNITED STATES

Year	Production [1] (thousands of bbls.)	Production [2] (thousands of bbls.)	Total value at [2] well (thousands of dollars)	Price per bbl. at well (dollars)	Total U.S. Production [3] Production (thousands of bbls.)	Total U.S. Production [3] Value (thousands of dollars)
1859		2	40	20.00		
1860		500	4 795	9.59		
1861		2 114	1 036	0.49		
1862		3 057 a	3 210	1.05		
1863		2 611	8 225	3.15		
1864		2 116	17 055	8.06		
1865		2 498	16 462	6.59		
1866		3 598	13 457	3.74		
1867		3 347	8 066	2.41		
1868		3 646	13 217	3.63		
1869		4 215	23 760	5.64		
1870		5 261	20 307	3.86		
1871		5 205	22 290	4.34		
1872		6 293	22 907	3.64		
1873		9 894	18 106	1.83		
1874		10 297	12 785	1.17		
1875		8 788	11 864	1.35	11 963	11 657
1876		8 969	22 979	2.56	9 133	22 876
1877		13 135	31 787	2.42	13 350	31 666
1878		15 164	18 045	1.19	15 397	17 948
1879		19 685	16 909	0.86	19 914	17 111
1880		26 028 b	24 596 b	0.95	26 286	24 464
1881		27 376 b	23 516 b	0.86	27 661	25 294
1882		23 368	18 250	0.78	30 511	23 475
1883		19 125	20 215	1.06	23 450	25 588
1884		20 541	17 152	0.84	24 218	20 346
1885		18 118	15 926	0.88	21 859	18 428
1886		23 647	16 837	0.71	28 415	20 274
1887		20 281	13 527	0.67	28 283	18 263
1888		16 489 b	14 444 b	0.88	27 612	19 524
1889		19 591	18 435	0.94	35 164	26 962
1890		28 458 b	24 673 b	0.87	45 824	35 363
1891		31 424	21 241	0.67	54 293	30 526
1892		27 149	15 303	0.56	50 515	25 912
1893		19 283	12 561	[illegible]		

PRODUCTION AND VALUE OF CRUDE OIL IN PENNSYLVANIA AND THE UNITED STATES - Continued

Year	Production [1] (thousands of bbls.)	Production [2] (thousands of bbls.)	Total value at well [2] (thousands of dollars)	Price per bbl. at well (dollars)	Total U.S. Production [3] Production (thousands of bbls.)	Total U.S. Production [3] Value (thousands of dollars)
1894		18 078	15 343	0.84	49 344	35 522
1895		18 231	24 900	1.37	52 892	57 634
1896		19 379	22 982	1.19	60 960	58 518
1897		17 983	14 296	0.80	60 476	40 873
1898		14 743	13 608	0.92	55 364	44 187
1899		13 054	17 053	1.31	57 072	64 601
1900		13 258	18 088	1.36	63 620	75 990
1901		12 625	15 431	1.22	69 389	66 419
1902		12 064	15 266	1.27	88 767	71 180
1903		11 355	18 171	1.60	100 461	94 694
1904		11 126	18 222	1.64	117 081	101 176
1905		10 437	14 653	1.40	134 717	84 159
1906		10 257	16 597	1.62	126 494	92 446
1907		10 000	17 580	1.76	166 095	120 106
1908		9 424	16 881	1.79	178 527	129 079
1909		9 299	15 425	1.66	183 171	128 329
1910		8 795	11 909	1.35	209 557	127 900
1911		8 248	10 894	1.32	220 449	134 044
1912		7 838	12 887	1.64	222 935	164 215
1913		7 917	19 691	2.49	248 446	236 200
1914		8 170	15 574	1.91	265 763	214 124
1915		7 839	12 431	1.59	281 104	179 461
1916		7 593	19 150	2.52	300 767	330 900
1917		7 733	25 154	3.25	335 316	522 636
1918		7 408	29 606	4.00	355 928	703 943
1919		8 137	33 688	4.13	378 367	760 266
1920		7 438	44 464	5.97	442 929	1 360 791
1921	7 251	7 418	24 746	3.33	472 183	814 745
1922	7 238	7 425	23 834	3.21	559 531	895 111
1923	7 068	7 609	25 320	3.33	732 407	978 430
1924	6 495	7 486	27 025	3.61	713 940	1 022 642
1925	6 770	8 097	29 310	3.62	763 743	1 284 927
1926	7 109	8 961	31 930	3.56	770 874	1 447 751
1927	9 639	9 526	29 150	3.06	901 129	1 172 800

PRODUCTION AND VALUE OF CRUDE OIL IN PENNSYLVANIA AND THE UNITED STATES - Continued

Year	Production [1] (thousands of bbls.)	Production [2] (thousands of bbls.)	Total value at well [2] (thousands of dollars)	Price per bbl. at well (dollars)	Total U. S. Production [3] Production (thousands of bbls.)	Total U. S. Production [3] Value (thousands of dollars)
1928	9 765	9 956	32 550	3.27	901 474	1 054 853
1929	11 772	11 820	44 800	3.79	1 007 323	1 280 417
1930	13 006	12 803	33 410	2.61	898 011	1 070 200
1931	11 844	11 892	23 550	1.98	851. 081	550 630
1932	12 209	12 412	23 400	1.89	785 159	680 460
1933	12 559	12 624	23 590	1.87	905 656	608 000
1934	14 316	14 478	35 200	2.43	908 065	904 825
1935	15 938	15 810	33 840	2.14	996 596	961 440
1936	17 136	17 070	41 450	2.43	1 099 687	1 199 820
1937	19 990	19 189	49 300	2.57	1 279 160	1 513 340
1938	17 626	17 426	32 760	1.88	1 214 355	1 373 060
1939	17 356	17 382	36 200	2.08	1 264 962	1 294 470
1940	17 435	17 353	39 700	2.29	1 353 214	1 385 440
1941	16 919	16 750	42 500	2.54	1 402 228	1 602 000
1942	17 842	17 779	52 250	2.94	1 386 645	1 643 470
1943	15 773	15 757	46 960	2.98	1 505 613	1 809 020
1944	14 590	14 118	46 400	3.29	1 677 904	2 032 960
1945	12 854	12 515	46 680	3.72	1 713 655	2 094 250
1946	13 261	12 996	49 470	3.81	1 733 424	2 441 810
1947	12 976	12 690	53 170	4.19	1 856 987	3 577 890
Total	346 737	1 099 674	2 052 420		35 023 276	43 138 775

1. Production from Report on Productive Industries, Public Utilities, and Miscellaneous Statistics by Pa. Dept. of Internal Affairs.
2. Figures from Mineral Resources of the United States by U. S. Geol. Survey and from Minerals Yearbook by the U. S. Bureau of Mines.
3. Figures for the years 1875 to 1929 are from Petroleum in the United States and Possessions by Arnold and Kemnitzer; and for 1930 to 1947 from Minerals Yearbook by U. S. Bureau of Mines.

a. In addition it is estimated that for want of a market, 10,000,000 barrels ran to waste in and prior to 1862 from Pennsylvania fields.

b. Pennsylvania and New York combined.

APPENDIX B

Status
of
Secondary Recovery Operations
in the
Pennsylvania Oil Fields

THE STATUS OF SECONDARY RECOVERY OPERATIONS IN THE PENNSYLVANIA OIL FIELDS.

TIOGA COUNTY

Field no.	Field name	Remarks
1.	Gaines	An unsuccessful water drive project was started in the Watrous pool in 1942.

POTTER COUNTY

2.	Hebron Center	A successful water drive project was started in 1940 and at present has almost reached its economic limit.
3.	Shingle House	A successful water drive project is now in operation in this field.

McKEAN COUNTY

4.	Windfall	Water flooding projects are in operation, but it is too soon to evaluate them.
5.	Bradford	Intensive water flooding has been in successful operation in this field since 1907.
6.	Moody Hollow	In 1943 an intensive gas drive project was tried, but was economically unsuccessful. A water flood project was not very successful.
7.	Sartwell	One water flooding project was tried in 1929, but at present this project is not operating.
8.	Coryville	A water drive project is in operation but it is too soon to evaluate it.
9.	Lewis Run	Secondary recovery operations have not been tried.
10.	Music Mountain	The primary production is being augmented by recycling the gas produced with the oil.
11.	Marshburg	An unsuccessful gas drive project was tried in 1940.
12.	Klondike	An old style "circle" type water flood was operated between 1920 and 1932. This was successful.
13.	West Branch	An unsuccessful small scale water drive was tried during 1936 and 1937.
14.	West Kinzua	Water flooding was attempted in this field, but was unsuccessful. A gas repressuring project has been in operation for a short time and has increased the oil production.
15.	Ormsby	Subsurface water flooding has been successful in the Bradford sand in this field.
16.	Marvin Creek	Secondary recovery operations have not been tried.
17.	Guffy	A successful intensive water drive has been in operation since 1937 in this field.
18.	Burning Well	Successful intensive water flooding has been in operation since 1930.

ELK COUNTY

19.	Kane	Unsuccessful water flooding projects have been tried. A gas drive project was tried, but was economically unsuccessful.
20.	Glen Hazel	Successful water flooding was started in 1940.
21.	St. Marys	Secondary recovery operations have not been tried.

WARREN COUNTY

Field no.	Field name	Remarks
22.	Youngsville - Five Points	One secondary recovery project is nearing completion, but no details are available.
23.	North Warren	An unsuccessful air-gas drive project was tried.
24.	Smith Corners	Secondary recovery operations have not been tried.
25.	Glade	An air and gas drive project was not successful. Another intensive air-gas project increased production.
26.	Gartland	Successful air-gas drive projects are in operation.
27.	Sill Run	Secondary recovery operations have not been tried.
28.	Morrison Run	A gas drive project was tried in the Clarendon sand, but was not successful.
29.	Clarendon	Successful air and gas drive projects have been tried. Successful intensive water drive is being used now.
30.	Kinzua	A successful air-gas drive is now in operation. Parts of the field have been under vacuum for years.
31.	Dew Drop	An unsuccessful water flood was tried.
32.	Deerlick	Water flooding was successful as long as the flood was controlled. The field is completely abandoned.
33.	Cooper	All methods of secondary recovery have been tried and where intensively applied have been successful.
34.	Bull Hill	Secondary recovery operations have not been tried.
35.	Cherry Grove	Secondary recovery operations have not been tried.
36.	Tidioute	Successful air, gas and air-gas drive projects are in operation. Part of the field is under vacuum.
37.	Colorado - Goodwill Hill - Grand Valley	Successful intensive air drive is being used in most of the field. Vacuum was used from 1910 to 1930.
38.	Selkirk	Successful air drive projects are in operation. Also an unsuccessful water flood project was tried.

FOREST COUNTY

39.	Balltown - Truemans	Successful gas drive projects have been tried. A large part has been under vacuum.
40.	Watson - Duhring	A successful gas drive project was tried. A water flood project was not economically successful.
41.	Salmon Creek	An air drive project met with some success.
42.	Lacy	A fairly successful gas drive is in operation. Vacuum has been tried.
43.	Red Brush	An air drive project was tried but was not successful. Vacuum was tried with no success.
44.	West Hickory	Successful air, gas or air-gas drive projects have been tried.

JEFFERSON COUNTY

45.	Lathrop	Secondary recovery operations have not been tried.
46.	Clear Creek	Secondary recovery operations have not been tried.

CRAWFORD COUNTY

47.	Dotyville	The field has been under vacuum for the last few years, which has increased the oil production considerably.
48.	Church Run	The field is being operated under successful intensive air-gas drive. The field was also under vacuum for a number of years.

CRAWFORD COUNTY - Continued

Field no.	Field name	Remarks
49.	Atlantic	Secondary recovery operations have not been tried.

VENANGO COUNTY

50.	Octave	A successful air drive project is in operation. Parts of the pool are under vacuum.
51.	Breedtown	An air drive project was tried and doubled the oil production. This project was abandoned for the air blew through a loose streak in the sand.
52.	Hamilton Corners	A successful air drive was tried in 1916.
53.	Cherrytree	A successful air drive project has been in operation since 1938.
54.	Pleasantville	Successful air and gas drive projects are in operation.
55.	Shamburg	Successful air drive is in operation. An unsuccessful water flood was tried. Vacuum was also used for many years.
56.	Pithole - Cashup	Successful air-gas drive projects are in operation.
57.	Rattlesnake	Successful air and gas drive projects are in operation in part of this pool.
58.	Petroleum Center - Pioneer	Successful air drive projects are in operation. These fields were under vacuum for many years.
59.	Oakland	Air drive projects have not been very successful.
60.	Oil City - Rouseville	Successful air drive projects are in operation. A water flood was unsuccessful. One sand is under vacuum.
61.	Walnut Bend	Successful air or gas drive projects are in operation.
62.	Sugar Creek - Niles	Economically unsuccessful water flooding and air drive projects have been tried.
63.	Franklin - Oak Forest	Air drive projects have been fairly successful. An intensive water drive project was unsuccessful. Vacuum has been on the field since 1920.
64.	Foster - Reno	Successful air drive projects have been tried.
65.	Hampton - Strong	A successful gas drive project was tried. Vacuum has been on the field since 1918.
66.	Cranberry - Rockland	Gas drive projects have been successful. A water drive project was unsuccessful. Field was under vacuum until 1935.
67.	Speechley	Secondary recovery operations have not been tried.
68.	Raymilton	Successful small scale air drive projects have been operating.
69.	Rullion - Clintonville	Successful air-gas drive projects are in operation. A water flood project was not successful. Vacuum is successful on some leases.
70.	Black Hill	Vacuum was tried but was unsuccessful. A small air drive project increased the production of gas.
71.	Emlenton - Richey Run	Successful gas drive projects have been tried.

MERCER COUNTY

72.	Cool Spring	Secondary recovery operations have not been tried.
73.	Volant	Successful air-gas drive projects are now in operation.

LAWRENCE COUNTY

74.	Bessemer	An unsuccessful water flood project was tried. Air drive projects were slightly successful. Vacuum was unsuccessful.
75.	Slippery Rock	Secondary recovery operations have not been tried.

ARMSTRONG COUNTY

Field no.	Field name	Remarks
76.	Butler Cross Belt	An unsuccessful small scale air-gas drive has been tried. The field has been under vacuum for over 50 years.

BUTLER COUNTY

77.	Cherry Valley	A successful gas drive project is in operation.
78.	Byram	A gas drive project was tried but no details are available. Vacuum has been used successfully on some leases.
79.	Rosenberry	A successful gas drive project is in operation. Vacuum has been in use for many years.
80.	Shira Streak	Successful air and gas drive projects have been tried.
81.	Parker	Successful gas drive has been tried. Most of the area is under vacuum.
82.	Hoover	Successful gas drive projects have been tried.
83.	Hooker	A successful gas drive project was tried in the third sand. Unsuccessful water flooding and air or gas drive were tried in the Speechley.
84.	Annisville - Ferris	Secondary recovery operations have not been tried.
85.	Queen Junction	No secondary recovery operations have been tried.
86.	Muddycreek	Vacuum was tried in this field, but was unsuccessful. Portions of this field have been under a natural water flood since 1904.
87.	Oneida	Secondary recovery operations have not been tried.
88.	Wadsworth - North Oakland	Secondary recovery operations have not been tried, except vacuum which was successful.
89.	Chicora	Successful small scale gas drive projects have been tried. Vacuum has been used for over 60 years.
90.	Alameda Park - Crooked Run	Secondary recovery operations have not been tried.
91.	Harmony - Zelienople	Secondary recovery operations have not been tried.
92.	Little Creek	Secondary recovery operations have not been tried.
93.	Evans City - Glade Run	Secondary recovery operations have not been tried.
94.	Callery - Watters	Vacuum was tried unsuccessfully. No other secondary recovery method was tried.
95.	Renfrew - McCalmont	Vacuum has been used for years. No other secondary recovery operation has ever been tried.
96.	Thorn Creek	Vacuum was successfully used for years. No other secondary recovery operation was ever tried.
97.	Brownsdale - Meharg	An unsuccessful gas drive using one in-put well was tried.
98.	Jefferson Center - Herman	A successful small scale gas drive project was tried. The field was under vacuum for 15 to 20 years.
99.	Mars - Glade Mills - Valencia	Secondary recovery operations have not been tried.
100.	Crider - Duncan	Secondary recovery operations have not been tried.
101.	Garvin	Vacuum was used for a while. The field is completely inactive.

CLARION COUNTY

102.	Cogley	A successful small scale gas drive is in operation. Vacuum aided production in early life of field.
103.	Knox	Rather unsuccessful gas drive projects have been tried.
104.	Clarion - Miola	Vacuum, along with re-cycling of gas, is being used successfully in some areas.

BEAVER COUNTY

Field no.	Field name	Remarks
105.	New Galilee	Secondary recovery operations have not been tried.
106.	Harbinson Hollow	Secondary recovery operations have not been tried.
107.	Smith's Ferry	Vacuum was used on a couple of leases and was moderately successful.
108.	Hookstown	A successful air drive has been in operation. An experiment with vacuum was unsuccessful.
109.	Carson	A successful air-gas drive has been in operation since 1936.
110.	Kendall	A successful air drive has been in operation in this same general area.
111.	Shannopin	Vacuum has been used successfully since 1913. Gas is being recycled into one in-put well successfully.
112.	Brenner	Secondary recovery operations have not been tried.
113.	Crows Run	Vacuum was used successfully for some time.
114.	Cookson	Vacuum was used successfully from 1904 to 1945.
115.	Economy - Legionville	Vacuum was used successfully for a few years.

ALLEGHENY COUNTY

116.	Brush Creek	Secondary recovery operations have not been tried.
117.	Bakerstown	A successful small scale gas drive project has been in operation for about 15 years.
118.	Millerstown	Vacuum has been used successfully. No other secondary recovery method has been tried.
119.	Duff City	An unsuccessful gas drive project was tried.
120.	Leetsdale	Secondary recovery operations have not been tried.
121.	Coraopolis - Moon	Secondary recovery operations have not been tried.
122.	Glenfield - Mt. Nebo	Secondary recovery operations have not been tried.
123.	Ingomar - Grubbs	Vacuum has been used successfully in Ingomar pool.
124.	Bellevue - Avalon	Secondary recovery operations have not been tried.
125.	Sandel - Wildwood	Secondary recovery operations have not been tried.
126.	Glenshaw	Secondary recovery operations have not been tried.
127.	Dorseyville	One air drive project was tried but was unsuccessful.
128.	Rural Ridge	Secondary recovery operations have not been tried.
129.	Milltown	An unsuccessful small scale gas drive was tried. Vacuum was also tried unsuccessfully.
130.	Neville Island	Secondary recovery operations have not been tried.
131.	Ewings Mill	Secondary recovery operations have not been tried.
132.	McCormick	Secondary recovery operations have not been tried.
133.	Aten	Secondary recovery operations have not been tried.
134.	Imperial	Vacuum was successfully used on the Hundred Foot sand in the early days.
135.	Moon Run - Crafton	An unsuccessful small scale gas drive project was tried. A small area is under vacuum.
136.	Chartiers	Secondary recovery operations have not been tried.
137.	Lickskillet - Hopper	A small air or gas drive project was tried in the Lickskillet field, but no details are available.
138.	Woodville	Secondary recovery operations have not been tried.
139.	Venice	Some secondary recovery operations have been tried but no details are available.
140.	McMurray	Secondary recovery operations have not been tried.

WASHINGTON COUNTY

141.	Cecil - Mawhinney	No secondary recovery operations have been tried.

WASHINGTON COUNTY - Continued

Field no.	Field name	Remarks
142.	Canonsburg	Secondary recovery operations have not been tried.
143.	McDonald	A fairly successful large scale gas drive project is in operation. Another sand is under vacuum.
144.	Florence	Unsuccessful small scale air or gas drive projects have been tried.
145.	Burgettstown	Unsuccessful gas drive and water flooding projects have been tried. One lease is operated under vacuum.
146.	Washington - Taylorstown	A successful large scale gas drive was started in 1923.
147.	Point Lookout	No secondary recovery operations have been tried.
148.	Lagonda	One successful and one unsuccessful gas drive projects were tried. Both were small scale.

GREENE COUNTY

149.	Fonner	An unsuccessful gas drive was tried on a small scale.
150.	Nineveh	Secondary recovery operations have not been tried.
151.	Grays Fork	An unsuccessful small scale gas drive project was tried.
152.	Wright Run	Secondary recovery operations have not been tried.
153.	Bristoria	An unsuccessful gas drive was attempted on a small scale about 15 years ago.
154.	Aleppo	Several small scale air or gas drive attempts were unsuccessful.
155.	Rutan	Secondary recovery operations have not been tried.
156.	Board Tree	One in-put well was subjected to an unsuccessful gas drive.
157.	New Freeport	Secondary recovery operations have not been tried.
158.	Garrison	Secondary recovery operations have not been tried.
159.	Lantz	Secondary recovery operations have not been tried.
160.	Mount Morris	Secondary recovery operations have not been tried.
161.	Dunkard Creek	Secondary recovery operations have not been tried.
162.	Tanner	Secondary recovery operations have not been tried.
163.	Whitely Creek	Secondary recovery operations have not been tried.
164.	Blackshire	Secondary recovery operations have not been tried.

APPENDIX C

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Aten FIELD No. 133
LOCATION Findley and Moon Town
Allegheny County Burgettstown and Carnegie Quadra
DISCOVERY DATE AND WELL 1896, W.Charlton #1, Initial production - 75 barrels dail

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	206	330 000		
Total	206	330 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1800	35	8	7-5/8 5-5/8	200 1000

PRODUCING WELLS None ABANDONED WELLS About 8
WELL SPACING Average 600' between wells
SAND CHARACTERISTICS - The Hundred Foot sand is very lenticular. It is a white, coarse-grained sandstone with pebbles in it as long as 1/5 inch.

OPERATIONS - Secondary recovery operations were never tried in this field.

REMARKS - Wells in this field were pumped by individual gas engine units. Initial productions were as high as 75 barrels of oil per day in the early days. The wells produced some water which was found below the oil pay. This field was abandoned about 1910. The new Greater Pittsburgh Airport is being built at the site of this field. There is no known fresh water flooding of the sands.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Shaw, E. W., and Munn, M. J., 1911a, U. S. Geol. Survey, Geol. Atlas 177; data from former operator in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

ELD NAME Bakerstown FIELD No. 117
OCATION Richland, West Deer, (Middlesex and Clinton) Township
llegheny and (Butler) County New Kensington Quadrangle
ISCOVERY DATE AND WELL 1888, Gold #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
ıird	3745	5 250 000	1 310 000	130 000
Total	3745	5 250 000	1 310 000	130 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
ıird	1800	25	7	10	250
				8-1/4	900
				6-5/8	1500

RODUCING WELLS 25 ABANDONED WELLS 400
VELL SPACING About 400' between wells
AND CHARACTERISTICS - The Third sand is usually hard and fine-grained with the ay streak not much softer than the main sand body. In places the Third sand is edium coarse-grained with soft pay streaks. The sand in this area is sometimes eparated by a shale break and when that occurs the upper part is called the Third nd the lower part is called the Fourth. Occasionally two pay zones are encountered in this sand.

OPERATIONS - A small scale gas drive project has been in operation in this field or about 15 years. Some of the producing wells trippled their production due to he gas drive. This project has been economically operated. Secondary recovery in his field looks promising except that most of the oil wells have been abandoned nd new wells would have to be drilled.

REMARKS - The wells are pumped by jacks and central power as well as individual nits. The southern part of this field has been watered out from poorly plugged ells. The Hundred Foot sand in this area contains a large amount of water. Initial productions of the early wells were as high as 1,000 barrels per day. About 0 percent of this field is inactive. Part of this field is in Butler County and ill be discussed in that section.

REFERENCE - Anonymous 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Richardson, G. B., 1932, U. S. Geol. Survey, Bull. 829.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Bellevue - Avalon (includes Hammerschmit and West View fields) FIELD No. 124

LOCATION Kilbuck and Ross Townshi

Allegheny County Sewickley and Carnegie Quadrangl

DISCOVERY DATE AND WELL Bellevue - 1888, Harvey #1, Initial production - 700 barrel daily. Hammerschmit, Hammerschmit #1, I.P. - 3 bbls; West View, Ivory #1, I.P. - 190 bbls.

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	838	1 676 000		
Upper Nineveh	162	324 000		
Total	1000	2 000 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1700	90	10	8-1/4, 6-5/8	0 through big lim 1610
Upper Nineveh	1800	25	10		

PRODUCING WELLS None ABANDONED WELLS About 75

WELL SPACING About 375' between wells

SAND CHARACTERISTICS - The Hundred Foot sand has a hard cap rock on top. The unproductive part of the sand is a white, fine-grained, well cemented sandstone, while the pay is a good, coarse, sugar sand. The first pay, if encountered, is about 33 feet in the sand and about 2 feet thick. This pay does not contain water. The second pay is about 63 feet in the sand and about 10 feet thick. This pay contains salt water. The Upper Nineveh sand is usually grayish-white, hard, fine-grained, with coarse, commonly pebbly pay zones.

OPERATIONS - Secondary recovery projects have never been tried in this field.

REMARKS - The wells were pumped with individual gas engine units. Initial productions up to 40 barrels per day per well, were encountered in the Hammerschmit field. Nine oil wells were drilled in this field. The water to oil ratio was 6 to 1. The number of wells drilled in the other fields are as follows: Bellevue 30, Avalon 20 and West View 16 All of these fields have been watered out with fresh or salt water. The Murrysville sand above the Hundred Foot sand, in this area, contains large amounts of salt water.

REFERENCE - Munn, M. J., 1911a, U.S. Geol. Survey, Geol. Atlas 176; Shaw, E. W., and Munn, M.J., 1911a, U.S. Geol. Survey, Geol. Atlas 177; data from former operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Brush Creek (includes Wexford) FIELD No. 116

LOCATION Marshall, Pine (Cranberry and Adams) Township
Allegheny (Butler) County Sewickley Quadrangle

DISCOVERY DATE AND WELL Brush Creek - 1888, Warren well; Wexford - 1894.

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	3763	7 500 000	1 880 000	180 000
Total	3763	7 500 000	1 880 000	180 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1600	100	10	6-1/4, 5	800, 1500
Snee	1800	15	4		

PRODUCING WELLS 20 ABANDONED WELLS 400

WELL SPACING About 500' between wells

SAND CHARACTERISTICS - The Hundred Foot sand consists of a close hard medium-grained sandstone with a shale break from 1 to 20 feet thick near the center of the formation. Within this sandstone occur lentils of a softer, more porous conglomeratic sandstone, which range in thickness up to 20 feet or more. The pay sand is found at different places in the formation. The first one occurs about 5 feet, the second one about 25 feet, one at 45 feet, and one at 65 feet in the formation. Snee, Boulder and Thirty Foot sands are occasionally productive. Only a single pay streak occurs in the Hundred Foot sand of the Wexford field at about 25 feet below the top.

OPERATIONS - Secondary recovery operations have never been tried in this field. Some sections of this field might be flooded with water but generally speaking the sand has not been flooded.

REMARKS - The wells are pumped with individual gas engine units. The initial productions of the early wells was as high as 200 barrels per day. The early wells had an oil to water ratio of 1 to 1. Now the oil to water ratio is about 1 to 40. The wells average about 1/2 barrel of oil per day. Part of this field is in Butler County but the entire field is discussed here.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Munn, M. J., 1911a, U.S. Geol. Survey, Geol. Atlas 176; data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Chartiers FIELD No. 136
LOCATION Chartiers and Greentree Town p
Allegheny County Carnegie Quadra e
DISCOVERY DATE AND WELL 1890, John Arbuckle #1, Initial Production - 5000 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Gordon	206	371 000		
Total	206	371 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Gordon	1700	32	9	8-1/4	250
				6-1/4	800
				4-7/8	1600

PRODUCING WELLS None ABANDONED WELLS 100
WELL SPACING About 600' average between wells
SAND CHARACTERISTICS - The Gordon sand is a yellowish colored sand. The first 13 feet of sand is fine and hard. Then comes 2 feet of coarse pay with pebbles up to 3/10 inch in length. Next is a 3 foot layer of hard siltstone followed by 7 feet of good, coarse, pebble pay sand. Below this the sand is hard and fine.

OPERATIONS - Secondary recovery operations have not been tried in this field. When the Hundred Foot sand contained water a string of 4-1/4 inch casing was used.

REMARKS - This field is entirely inactive. The Beck well had an initial production of 3600 barrels a day. Originally the Gordon did not contain water. Initial productions of second crop wells were as high as 8 barrels per day. This field has been watered out from poorly plugged wells. The water pumped by the wells never got very fresh, but the wells increased in water production until they would produce about 6 barrels of water a day and no oil. The wells would continue to drizzle water if they were pumped after pumping their heads.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from former operator in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

ELD NAME Coraopolis - Moon (includes Haysville) **FIELD No.** 121
OCATION Moon, Findley and Sewickley Heights Township
legheny County Sewickley Quadrangle
ISCOVERY DATE AND WELL 1890, J. Goss #3

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
rdon (Coraopolis)	1371	1 370 000	340 000	34 000
rdon (Moon)	541	540 000	135 000	13 000
Total	1912	1 910 000	475 000	47 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
rdon	1700 to 2100	12	5	7-5/8, 5-5/8, 4-1/4	200, 1000, 1800

RODUCING WELLS Moon - 9, Coraopolis - 10 **ABANDONED WELLS** Moon - 50 Coraopolis - 100
VELL SPACING About 450' between wells
AND CHARACTERISTICS - The Gordon sand consists of about 1-1/2 feet of bluish-gray, ard rock on top and immediately below this occur pebbles up to 1/2 inch long. The ay part of the sand occurs just under this pebbly streak or in the bottom of the sand. he pay sand is white and fine. The sand runs in streaks in this field.

OPERATIONS - Secondary recovery operations have not been tried in this field. At he Northern end of the Coraopolis field a small natural water drive has started. ne well has been flooded out and the well next to it increased in production from 0 to 120 barrels of oil per month.

REMARKS - The wells are pumped with individual gas engine units. A well on the . A. Doughty had an initial production of 300 barrels per day of oil in the early lays. The 4-1/4 inch casing is only run when water is encountered in the Hundred oot sand. The average oil production today per well is about 1 barrel and about /2 barrel of water. Some of the wells got small and were abandoned while others slowly decreased in oil and increased in salt water. There is spotty Hundred Foot sand production in this field with the wells producing a great deal of water.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Munn, M. J., 1911a, U.S. Geol. Survey, Geol. Atlas 176; data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Dorseyville (Deer Creek) FIELD No. 127
LOCATION Indiana and Harmar Towns
Allegheny County New Kensington Quadran
DISCOVERY DATE AND WELL 1900

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Thirty Foot	1282	2 050 000	510 000	51 000
Total	1282	2 050 000	510 000	51 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Thirty Foot	1930	45	8	8-1/4 6-5/8 5-3/16	500 1000 1800

PRODUCING WELLS 70 ABANDONED WELLS Unknown
WELL SPACING About 500' between wells
SAND CHARACTERISTICS - The Thirty Foot sand usually contains two pay streaks. The pay streaks are reported as good, soft sand ranging in texture from fine-grained to pebbly. Those parts of the Thirty Foot sand that do not contain oil are reported as hard and tight. The pay streaks are not persistent but occur irregularly. Usually the upper part of the sand is barren. The pay streaks average between 3 and 5 feet in thickness.

OPERATIONS - One air drive project was tried but was unsuccessful. The Thirty Foot sand would not take the air at pressures up to 350 p.s.i.

REMARKS - The wells are pumped with individual gas engines. Some oil is found in the Hundred Foot but the production is very spotty. The initial productions of wells in the Thirty Foot sand were as high as 1,140 barrels a day with an average of 100 barrels per day. Very little or no water is found in the Thirty Foot sand. Average production for a well today is about 1/2 barrel a day.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Richardson, G. B., 1932, U. S. Geol. Survey, Bull. 829; data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Duff City (includes Zimer field) FIELD No. 119
LOCATION Franklin and Marshall Township
Allegheny County Sewickley Quadrangle
DISCOVERY DATE AND WELL 1890, Duff #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Thirty Foot	200	480 000		12 000
Snee	704	1 410 000	350 000	35 000
Total	904	1 890 000	350 000	47 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Thirty Foot	1450 to 1850	30	12	8-1/4, 6-1/4, 4-7/8	300, 800, 1500
Snee	1500 to 1900	15	10		

PRODUCING WELLS 120 ABANDONED WELLS 400
WELL SPACING 400' to 500' between wells
SAND CHARACTERISTICS - The Thirty Foot sand is a dark gray, fine-grained, broken sandstone. The producing areas are spotted. The Snee sand is a bluish-gray, fine- to coarse-grained sandstone with a soft porous pay zone with pebbles up to 3/10 inch in length.

OPERATIONS - A gas drive project was tried on the Thirty Foot but the project was not successful. The sand took only a small amount of gas at very high pressures and no increase in production was noted. The Thirty Foot will not take water. Accidental water flood has occured in a couple of areas of the Snee sand and wells have increased from 1/2 to 3 barrels per day. Vacuum will work on the Hundred Foot sand but not on the Thirty Foot or Snee.

REMARKS - The wells are pumped with individual gas engine units. The Hundred Foot production is very spotty. The Zimer field is completely abandoned and is flooded with fresh and salt water. Oil in the Zimer field was found in the top of the Snee sand which is about 15 feet thick. Spotty oil production is also found in the Boulder sand. A well producing from this sand had an initial production of 400 barrels a day. Average production of wells in this field at the present time is 1/2 barrel per day.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Munn, M. J., 1911a, U.S. Geol. Survey, Geol. Atlas 176; data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Ewings Mill FIELD No. 131
LOCATION Robinson and Moon Towns
Allegheny County Carnegie Quadran
DISCOVERY DATE AND WELL 1892, Young #1, Initial production-3500 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	619	1 114 000		
Total	619	1 114 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1750	28	9	8-1/4 6-1/4	200 1000

PRODUCING WELLS 5 ABANDONED WELLS 30
WELL SPACING About 600' between wells
SAND CHARACTERISTICS - The Hundred Foot sand is productive of oil only in the upper part of the sand or the section known as the Gantz sand. The upper 16 feet of the Gantz sand is a white, fine, hard sand. Under this occurs about 9 feet of pay sand which is a white, coarse sand full of pebbles as long as 4/5 inch. Under this pay the sand hardens and runs into about 11 feet of shale. Then comes about 70 feet of sand known as the Fifty Foot and which in this area contains only salt water.

OPERATIONS - Secondary recovery projects have never been tried in this field. In later years wells were drilled through the break into the Fifty Foot sand which contains large amounts of saltwater. This water came up the hole and flooded the Gantz sand. As the flood moved the wells increased in gas production, then in oil, next increased in water and finally produced all water. This field is flooded with salt water.

REMARKS - The wells are pumped with individual gas engine units. Several of the early wells made up to 1500 barrels a day of oil. At present 3 wells are producing from the Fourth sand and only 2 wells from the Hundred Foot sand. The Hundred Foot wells produce about 1 barrel per day of oil and some water. Originally there was no water in the Gantz sand.

REFERENCE - Data from former operators in this field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Glenfield-Mt. Nebo FIELD No. 122

LOCATION Allepo, Sewickley Heights, and Ohio. Township

Allegheny County Sewickley Quadrangle

DISCOVERY DATE AND WELL Glenfield - 1895, John Wachter, Initial production - 18 barrels daily; Mt. Nebo - 1886, McCrea, Initial production - 8 barrels

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Gordon (Mt. Nebo)	156	250 000	63 000	6 000
Fourth (Glenfield)	558	1 120 000		3 000
Total	714	1 370 000	63 000	9 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Gordon	2100	25	8	8-1/4	125
Fourth	1900	15	10	6-5/8	800
				5-3/16	1 750

PRODUCING WELLS 20 ABANDONED WELLS 130

WELL SPACING About 400' between wells

SAND CHARACTERISTICS - The Gordon sand consists of two streaks of pay from 1 to 4 feet thick and is a fine conglomerate of white quartz pebbles which range in size from coarse sand to well-worn pebbles as long as 3/10 inch. The Fourth sand is a fine- to medium-grained sandstone with a soft (sometimes pebbly) pay.

OPERATIONS - Secondary recovery has not been tried in this field and does not look promising for the Glenfield pool but probably will work in the Mt. Nebo pool.

REMARKS - The wells are pumped by individual gas engine units. The Third sand contains no water and initial productions of the wells were as much as 50 barrels per day. The Fourth sand contained little or no water at first but is now flooded with fresh water. Some initial productions were over 100 barrels per day. During accidental water flood the production of some wells went from 1/2 to 5 barrels per day. Most of the Glenfield pool is inactive.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Munn, M. J., 1911a, U. S. Geol. Survey, Geol. Atlas 176; data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Glenshaw FIELD No. 126
LOCATION Shalor, O'Hara and Indiana Town
Allegheny County New Kensington Quadran
DISCOVERY DATE AND WELL 1888, Kessler #1, Initial production about 50 barrels dai

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Thirty Foot	1 499	899 000	225 000	23 000
Total	1 499	899 000	225 000	23 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Thirty Foot	1 750	35	3	8-1/4	150
				6-5/8	650
				5-3/16	1 700

PRODUCING WELLS 50 ABANDONED WELLS 150
WELL SPACING About 600 feet average between wells
SAND CHARACTERISTICS - The Thirty Foot sand is usually grayish-white, hard, fine-grained, with a coarse commonly pebbly, open pay sand. Some of the pebbles are 4/5 inch long. The wells with small production produce from a pay which is very tight. Generally only one pay is found but sometimes two pays are present. The first pay is 2 feet below the top of the sand and the second is 20 feet in the sand.

OPERATIONS - No form of secondary recovery has ever been tried. The sand does not contain fresh water. This sand does not look very favorable for secondary recovery due to its spotted nature. There are specific areas where wells are producing from the same porous area where secondary recovery might work.

REMARKS - The wells are pumped with individual gas engine units. The largest initial production in the early life of the field was 50 barrels per day. Later wells ranged from 1 to 10 barrels a day. The production is very spotted in this field and each well seems to be producing from a separate porous bed in the sand. The average production today is about 1/3 of a barrel per day per well. According to Pa. Geol. Survey, 4th Ser., Bull. M19, the field was discovered in 1880.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Richardson, G. B., 1932, U. S. Geol. Survey, Bull. 829; data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Imperial FIELD No. 134

LOCATION North Fayette, Findley and Moon Township

Allegheny County Carnegie and Burgettstown Quadrangle

DISCOVERY DATE AND WELL 1893, Johnston #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	294	529 000	132 000	13 000
Lower Nineveh	1563	2 491 000	623 000	62 000
Total	1857	3 020 000	755 000	75 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1800	35	9	8-1/4, 6-1/4	200, 1175
Lower Nineveh	1925	12	8		

PRODUCING WELLS 30 ABANDONED WELLS About 200

WELL SPACING 600 feet average well spacing

SAND CHARACTERISTICS - The Hundred Foot sand is very lenticular and spotted, with a variable sand composition. The Lower Nineveh consists of a white pebbly sand. The first 4 feet of sand is hard and pebbly with pebbles up to 1/2 inch in length. About 4 feet in, the pay is encountered. The pay contains pebbles and, in places, the best part of it is a fine muddy sand. The bottom of the sand is hard.

OPERATIONS - The Hundred Foot sand had vacuum on it in the early days. No other secondary recovery method has been tried.

REMARKS - The wells are pumped with individual gas engine units. Initial productions in the Hundred Foot sand were as high as 250 barrels a day of oil and some of the wells produced large quantities of water in the early days. The Lower Nineveh sand wells were as much as 30 barrels of oil per day in initial productions, in the early days and produced no water. In 1910 a new well had an initial production of about 4 barrels of oil a day but soon decreased to practically nothing. The average production from this sand today is about 3/4 of a barrel per day per well of oil and no water. There has been no fresh water flooding of this sand.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Ingomar - Grubbs **FIELD No.** 123

LOCATION Sewickley Heights and Franklin Town

Allegheny County Sewickley Quadra

DISCOVERY DATE AND WELL Ingomar - 1905, James Neely, Initial production - about 2 rels daily; Grubbs - 1893, Grubbs #1, Initial production - 4,800 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot (Ingomar)	343	690 000	170 000	17 000
Boulder (Grubbs)	160	300 000	80 000	8 000
Total	503	990 000	250 000	25 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1800	90	10	8-1/4	180
Boulder	1900	12	10	6-1/4	800
				4-7/8	1600

PRODUCING WELLS 3 **ABANDONED WELLS** 75

WELL SPACING About 500 feet between wells

SAND CHARACTERISTICS - The Hundred Foot sand consists of a close, hard, medium-grained sandstone with a shale break, from 1 to 20 feet thick, near the center of the formation. From 1 to 3 pays are present consisting of soft, porous, conglomeratic sandstone. The Boulder sand in this field is a lense of open, porous sand which pinches out around the edges of the field into a closer, harder sandstone.

OPERATIONS - Vacuum, used in the Ingomar field, is the only secondary recovery operation used in this field. The use of vacuum increased the production of some wells from 1 to 5 barrels a day. These two fields have not been flooded with fresh water.

REMARKS - The wells are pumped with individual gas engine units. The wells in the Hundred Foot sand generally produced from 5 to 50 barrels of water to 1 of oil. The initial productions of early wells in this sand were as great as 180 barrels per day. The Boulder sand contains no water and early initial productions were rather high. The Hundred Foot wells pumped 24 hours a day to get rid of water.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Munn, M. J., 1911a, U.S. Geol. Survey, Geol. Atlas 176; data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Leetsdale (includes Phillips and Sevins fields) FIELD No. 120
LOCATION Crescent and Sewickley
Allegheny County Sewickley Township Quadrangle
DISCOVERY DATE AND WELL 1904

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	810	1 940 000		
Total	810	1 940 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1200 to 1600	40	12	8-1/4 6-1/4	50 700

PRODUCING WELLS None ABANDONED WELLS 60
WELL SPACING From town lot to 400 feet
SAND CHARACTERISTICS - The Hundred Foot sand has 5 feet of cap rock on top which is very hard and bluish-gray in color. This cap rock grades into a 4 foot layer of bluish, hard, fine-grained, siltstone. Below this is about 12 feet of pay which is white, coarse, conglomeratic sandstone with pebbles up to one inch in diameter. This pay grades into a white fine sandstone which gets darker in color down to the bottom of the sand.

OPERATIONS - Secondary recovery projects have never been tried in this field. The field has been flooded with fresh water from the river during flood stage. This field does not look favorable for secondary recovery operations.

REMARKS - The wells were pumped with individual gas engine units and some central power systems. The early wells had initial productions up to 50 barrels of oil per day per well. Some of the wells had to pump 24 hours a day to pump down the water. Others produced just a little water. The average water to oil ratio was about 2 to 1. These fields have all been flooded with fresh water.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Munn, M. J., 1911a, U.S. Geol. Survey, Geol. Atlas 176; data from former operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Lickskillet - Hopper FIELD No. 137
LOCATION S. Fayette, Collier and Upper St. Clair Town
Allegheny County Carnegie Quadra
DISCOVERY DATE AND WELL 1895

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	1464	2 715 000	679 000	68 000
Fourth	597	1 194 000	299 000	30 000
Total	2061	3 909 000	978 000	98 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	2100	50	9	6-1/4	1250
Fourth	2300	18	10		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 500 feet between wells
SAND CHARACTERISTICS - The Hundred Foot sand is a quartzose, very fine- to coarse-grained conglomeratic sandstone with a few interbedded shales. The Fourth sand is usually hard and fine-grained.

OPERATIONS - A small repressuring operation was tried in the Lickskillet field, but no details are available.

REMARKS - The field is about 75 percent inactive. The lower part of the Hundred Foot sand contains the oil and also some salt water. The Fourth appears to be free of salt water. Some Hundred Foot wells make 4 barrels of salt water per barrel of oil and others make 1/4 barrel of salt water per barrel of oil. No wells are known to be lost by fresh water flooding. The wells are pumped by individual gas engines.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Shaw, E. W., and Munn, M. J., 1911a, U.S. Geol. Survey, Geol. Atlas 177; data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME McCormick FIELD No. 132

LOCATION Moon, N. Fayette and Findley Township

Allegheny County Carnegie Quadrangle

DISCOVERY DATE AND WELL 1890's

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	163	293 000	73 000	7 000
Fourth	142	199 000	50 000	5 000
Total	305	492 000	123 000	12 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1775	50	9	8-1/4, 6-1/4,	155, 700,
Fourth	2000	13	7	4-7/8	1500

PRODUCING WELLS 4 ABANDONED WELLS 15

WELL SPACING 600 feet average

SAND CHARACTERISTICS - The Hundred Foot sand is very lenticular and spotted with a variable sand composition. The Fourth sand is usually fine-grained and hard.

OPERATIONS - Secondary recovery operations have not been tried in this area.

REMARKS - About all the field is inactive. Some salt water is found in the Hundred Foot. There is no known fresh water flooding of wells. The wells are all pumped by individual gas engines.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME McDonald (includes McCurdy field) FIELD No. 143
LOCATION North Fayette, South Fayette, Collier, Robinson (Cecil and Robinson) Townsl
Allegheny(Washington)County Carnegie and Burgettstown Quadran
DISCOVERY DATE AND WELL 1890, McDonald #1, Initial production - 12 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	142	231 000	50 000	5 000
Gordon Stray	77	125 000	27 000	3 000
Gordon	3746	8 922 000	1 836 000	184 000
Fifth	6981	15 882 000	3 421 000	342 000
Total	10 946	25 160 000	5 334 000	534 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1926	85	5	10, 8-1/4	150, 1125,
Gordon Stray	2163	13	5	6-5/8, 5-3/16	1330, 2100
Gordon	2186	22	7		
Fifth	2306	25	7		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 400 to 800 feet (600 average)

SAND CHARACTERISTICS - The Hundred Foot sand is a quartzose, very fine to coarse-grained, conglomeratic sandstone with a few interbedded shales. The Gordon Stray sand is quartzose, fine- to medium-grained and often contains shale beds. The Gordon sand is a highly quartzose, light gray to white, fine-grained to conglomeratic sandstone. In some wells two pays in the Gordon are separated by a dense, fine-grained sand or sandy shale lense. The Fifth sand is highly quartzose, fine-grained sand to conglomeratic, and light gray to white in color with a few shale breaks. Occasionally there are several pays which are separated by a tight sand or shale bed.

OPERATIONS - A large area in this field has been under gas repressuring applied to the Gordon sand and oil recovery by this method has been as much as 100 barrels per acre foot on one particular lease. Natural water flooding in some areas has greatly increased the production from both the Gordon and the Fifth sands. The Fifth sand is also under vacuum. Production in the McCurdy field is chiefly Fifth sand.

REMARKS - The Hundred Foot sand may have 2 pay zones; the Gordon 2 and the Fifth may have several. The Hundred Foot frequently contains salt water. The Gordon Stray is devoid of salt water. The Gordon has some in the southeastern and eastern part of the field and the Fifth contains very little. Most of the production of oil comes from the Fifth and Gordon sands. Initial productions were as high as 14,000 barrels per day but now the average initial production is 1 barrel per day. The wells are pumped by individual gas engines. Part of this field is in Washington County and is reported in that section.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME McMurray **FIELD No.** 140

LOCATION Bethel (Peters) Township

Allegheny (Washington) **County** Carnegie **Quadrangle**

DISCOVERY DATE AND WELL About 1888

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	174	244 000	61 000	6 000
Total	174	244 000	61 000	6 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	2150	80	7 to 8	10, 8-1/4, 6-5/8	300 1175 1400

PRODUCING WELLS Unknown **ABANDONED WELLS** Unknown

WELL SPACING 200 to 800 feet

SAND CHARACTERISTICS - The sand ranges from a very fine to coarse-grained sandstone, conglomeratic in places, with some interbedded shale beds.

OPERATIONS - Secondary recovery has not been tried in this field.

REMARKS - Initial productions of early wells were as high as 85 barrels per day and some recent wells have started at 15 barrels. About all of the field is inactive. Some saltwater is encountered. The ratio is about 4 barrels of salt water per barrel of oil. Part of this field is in Washington County and is discussed in that section.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Fettke, Charles R., Stephenson, Robert C., and Tignor, E. M., 1946, Pa. Geol. Survey, 4th Ser., Bull. M28; data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Millerstown FIELD No. 118

LOCATION West Deer, Fawn (Buffalo) Towns

Allegheny (Butler) County New Kensington Quadrar

DISCOVERY DATE AND WELL 1925, Jim Elliott #1, Initial production - about 5 barrel daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Fifth	310	310 000	100 000	50 000
Total	310	310 000	100 000	50 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Fifth	2100	16	5	10, 8-1/4, 6-1/4	250, 900, 1500

PRODUCING WELLS 7 ABANDONED WELLS 14

WELL SPACING About 400 feet between wells

SAND CHARACTERISTICS - The Fifth sand consists of a white to gray, fine-grained, well cemented hard sandstone with open pebbly pays. Sometimes two pays are present. The first pay occurs at the top of the sand while the second pay occurs about 16 feet in the sand.

OPERATIONS - This field has vacuum on it, which has increased the production about 30 percent. No other secondary recovery methods have been tried in this field. The sand has not been flooded with fresh or salt water.

REMARKS - The wells are pumped with individual gas engine units. The Fifth sand does not contain water. The largest initial production in the early life of the field was 800 barrels a day. One well flowed 200 barrels a day for 3 months, through the casing. The average production today is about 3 barrels per day per well. Part of this field is in Butler County but it is discussed entirely in this section.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Richardson, G. B., 1932, U.S. Geol. Survey, Bull. 829; data from present operator in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Milltown (includes some small producing areas in vicinity) FIELD No. 129

LOCATION Plum and Penn Township
Allegheny County Pittsburgh, New Kensington, Freeport and Greensburg Quadrangle

DISCOVERY DATE AND WELL Hundred Foot - 1894, Caldwell #1; Speechley - 1917

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	3 797	4 560 000	1 140 000	114 000
Speechley	206	410 000	103 000	10 000
Total	4 003	4 970 000	1 243 000	124 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1900	110	6	8-1/4,	500,
Speechley	3050	45	10	6-5/8,	900,
				4-7/8	1855

PRODUCING WELLS 70 ABANDONED WELLS 250

WELL SPACING About 400 feet between wells

SAND CHARACTERISTICS - The Hundred Foot sand is a white, medium- to coarse-grained sidstone, with a fairly high porosity. Commonly there are 2 pays which are described a nice pebble sand. Production is very spotted and where dry, the sand is hard and t;ht. The pays occur about 50 feet and 70 feet in the sand. The Speechley sand is a;ypically chocolate color and has medium hardness and texture.

OPERATIONS - One gas drive project was tried and was unsuccessful; probably due t poor equipment. Vacuum was tried on one well, but no increase in production vs seen. The production in this field is spotted, but a few areas probably vuld respond to air or gas drive.

REMARKS - The wells are pumped with individual gas engine units. Initial productions were up to 100 barrels, but averaged less than 20 barrels in the Hundred Foot nd. Variable amounts of water are usually present in the Hundred Foot sand. ter sometimes occurs above the oil pay, but generally the oil and water come together. The Speechley sand had initial productions up to 30 barrels, but they obably did not average over 10 barrels. One Hundred Foot well produces 90 rrels of water to 1 barrel of oil.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National fense (Unpublished); Richardson, G.B., 1932, U.S. Geol. Survey, Bull. 829.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Moon Run - Crafton FIELD No. 135
LOCATION Stowe, Robinson, Chartiers, Collier and Kennedy Town
Allegheny County Carnegie Quadra
DISCOVERY DATE AND WELL 1888, Phelps #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	54	97 000	24 000	2 000
Gordon Stray	87	122 000	30 000	3 000
Gordon	1 620	2 592 000	648 000	65 000
Fourth	283	677 000	169 000	17 000
Fifth	305	488 000	122 000	12 000
Total	2 349	3 976 000	993 000	99 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1700	60	9	8-1/4,	900,
Gordon Stray	2000	25	7	6-5/8,	1150,
Gordon	2100	40	8	5-3/16	1950
Fourth	2200	25	12		
Fifth	2250	20	8		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 400 to 800 feet (average 600)

SAND CHARACTERISTICS - The Hundred Foot is a light colored, fine-grained to coarse, pebbly, lenticular sandstone. The Gordon Stray is quartzose, fine- to medium-grained and often contains shale beds. The Gordon is usually coarse-grained with a soft pebbly pay streak. The Fourth sand is hard and fine-grained. The Fifth is fine-grained with usually a pebbly pay. Oil occurs in several pays in the Fourth and Fifth sands but is most persistent near the base of the Fourth.

OPERATIONS - A small gas repressuring set-up was tried just southwest of the southeastern end of Neville Island. It was somewhat crude and not very effective. The Fifth sand is under vacuum in about 6 wells.

REMARKS - Initial productions at the beginning varied from 50 to 2,000 barrels per day, but recently drilled wells had initial productions less than 1 to 10 barrels. The Hundred Foot sand contains variable amounts of saltwater which is necessary to be cased off. The other sands contain some. About 85 percent of the field is inactive. Pumping is done by individual gas engines. Some wells have a little saltwater - about 1/2 barrel per barrel of oil.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Shaw, E.W., and Munn, M.J., 1911a, U. S. Geol. Survey, Geol. Atlast 177; data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

LD NAME Neville Island FIELD No. 130

CATION Stowe Township
legheny County Carnegie Quadrangle

)ICOVERY DATE AND WELL About 1900

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	795	1 431 000	358 000	36 000
Total	795	1 431 000	358 000	36 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1700	60	9	8-1/4, 6-5/8, 5-3/16	900, 1150, 1950

PODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING 600 feet average

SAND CHARACTERISTICS - The Hundred Foot is a light colored, fine- to coarse-grained, pebbly, lenticular sandstone.

OPERATIONS - Secondary recovery has not been tried in this field. The sand in this field is harder and more in streaks than in Moon Run so repressuring probably would not work as well, except on a small scale.

REMARKS - About 98 percent of the field is inactive. The initial productions of early wells varied from 50 to 2000 barrels per day but recently drilled wells had initial productions of from 2 to 10 barrels per day. The Hundred Foot sand contains some salt water. No wells are known to be flooded out by fresh water.

REFERENCE - Data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Rural Ridge FIELD No. 128
LOCATION Indiana and Harmor Tow
Allegheny County New Kensington Quadr
DISCOVERY DATE AND WELL Thirty Foot - 1913; Fifth - November 9, 1918, Initial production - 300 barrels daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Thirty foot	1 166	1 166 000	291 000	29 000
Fifth	300	360 000	90 000	9 000
Total	1 466	1 526 000	381 000	38 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Thirty foot	1500 to 1800	20	5	8-1/4,	160,
Fifth	2000	20	6	6-5/8,	700,
				5-3/16	1700

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 600 feet
SAND CHARACTERISTICS - The Thirty Foot sand is a light, gray to white, sugar, pebbl sand where productive and hard and close where unproductive. The Fifth sand is a gra fine-grained sandstone with a soft, pebble pay.

OPERATIONS - Secondary recovery operations have never been tried in this field.

REMARKS - The wells are pumped with individual gas engine units. The Fifth sand production is rather spotty. The initial productions in the Fifth sand were as high as 300 barrels daily. The initial productions of wells in the Thirty Foot sand were small. The water to oil ratio in this sand is about 1 to 3. About 3 Fifth sand wells are producing in this area.

REFERENCE - Richardson, G.B., 1932, U.S. Geol. Survey, Bull. 829; data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

LD NAME Sandle - Wildwood (includes Evergreen field) **FIELD No.** 125

CATION Richland, Hampton, and McCandless Township
legheny County New Kensington and Sewickley Quadrangle

)ICOVERY DATE AND WELL Wildwood - 1889, Austin Heirs, Initial production - 1300 arels daily; Evergreen - 1899

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	(See below)			
Third	2 760	5 600 000	1 380 000	138 000
Total	2 760	5 600 000	1 380 000	138 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1550	110	5	8-1/4,	250,
				6-5/8,	700,
Third	1850	20	10	5-3/16	1525,

PRODUCING WELLS 140 **ABANDONED WELLS** 200

WELL SPACING About 500 feet between wells

SAND CHARACTERISTICS - The Hundred Foot sand whose production is spotted, consists of a hard, fine- to coarse-grained sandstone with softer pay zones where productive. The Third sand is a hard, tight, fine- to coarse-grained sand with a loose, coarse-grained to pebble pay. A large percentage of the wells has two pays.

OPERATIONS - Secondary recovery projects have not been tried in this area. Well abandonments are so scattered that any form of secondary operation is impossible without some redrilling.

REMARKS - The wells are pumped with individual gas engine units. Initial productions were very high in the Third sand. Wells of 2,000 to 3,000 barrels when first drilled were common. The average was several hundred barrels. The Third sand wells were later plugged and produced from the Hundred Foot sand in the northeastern part of the field. The Hundred Foot wells averaged about 10 barrels per day initial production and were as high as 50 barrels per day. This sand carries variable amounts of water. No water is found in the Third sand.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Munn, M. J., 1911a, U.S. Geol. Survey, Geol. Atlas 176; Richardson, G. B., 1932, U. S. Geol. Survey, Bull. 829.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Venice **FIELD No.** 139
LOCATION South Fayette (Chartiers, Cecil and Mt. Pleasant) Tow
Allegheny(Washington)County Carnegie (Burgettstown) Quadr
DISCOVERY DATE AND WELL 1893

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Fourth	282	677 000	169 000	17 000
Total	282	677 000	169 000	17 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Fourth	2330	20	12	10,	150
				8-1/4,	1125
				6-5/8,	1330
				5-3/16	2100

PRODUCING WELLS Unknown **ABANDONED WELLS** Unknown
WELL SPACING 400 to 800 feet (average 600)
SAND CHARACTERISTICS - The Fourth sand is gray to grayish-brown, fine- to coarse-grained, occasionally conglomeratic, and irregularly shaly. The pay is usually found in the medium- to coarse-grained "sugary" sand. Pebbles or cobbles are of various sizes and shapes.

OPERATIONS - Some secondary recovery operations have been tried in this field. The 5-3/16 inch casing is used only where much water is encountered in the Hundred Foot and Gordon sands.

REMARKS - About 70 percent of the field is inactive. The wells are pumped with individual gas engine units. An initial production of 2,000 barrels per day was the maximum, but the average was 200 barrels. An initial production of over 10 barrels in recently drilled wells is rare. A small amount of salt water is present in the Fourth sand. Future possible production will no doubt have to be confined to the existing wells because of the high cost of drilling new wells for secondary recovery operations. Part of this field is in Washington County and is discussed in that section.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

ALLEGHENY COUNTY, PENNSYLVANIA

FIELD NAME Woodville FIELD No. 138
LOCATION Scott and Collier Township
Allegheny County Carnegie Quadrangle
DISCOVERY DATE AND WELL 1892, John Schmitt #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Uper Nineveh	44	53 000	13 000	1 000
Lwer Nineveh	207	414 000	104 000	10 000
Total	251	467 000	117 000	11 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Uper Nineveh)			6	10,	150,
Lwer Nineveh)	2050	35	10	8,	1100,
				6	1250

PRODUCING WELLS 5 ABANDONED WELLS 20
WELL SPACING 350 feet

SAND CHARACTERISTICS - The Nineveh (Thirty Foot) sandstones are hard, fine- to coarse-grained, and reddish in color. Generally only one pay is present and it ranges from 9 to 25 feet below the top of the sand. This pay is coarse with white quartz pebbles which range from 1/10 to 4/5 inch in length. Occasionally there is a 5 foot gas pay about 4 feet below the top of the sand.

OPERATIONS - Secondary recovery operations have not been tried in this field.

REMARKS - The initial production of the first well was about 100 barrels per day, but more recent wells made 3 to 5 barrels the first day. Now the wells produce about 1-1/4 barrels of oil per day per well and very little saltwater. No fresh water flooding is known to exist. The wells are pumped by individual gas engines.

REFERENCE - Shaw, E.W., and Munn, M.J., 1911a, U.S. Geol. Survey, Geol. Atlas 177; data from present operators in the field.

ARMSTRONG COUNTY, PENNSYLVANIA

FIELD NAME Butler Cross Belt **FIELD No.** 76
LOCATION Perry, Brady's Bend (Parker and Fairview) **Town**
Armstrong (Butler) **County** Foxburg, Kittanning (Butler and Hilliards) **Quadra**
DISCOVERY DATE AND WELL 1870, J. F. Mildren Farm, Initial production - 2,000 barrels daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Third	312	624 000	156 000	16 000
Fourth	5 894	16 500 000	4 126 000	413 000
Total	6 206	17 124 000	4 282 000	429 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Third	1480	30	10	6-1/4, 5	700,
Fourth	1525	25	14		1300

PRODUCING WELLS Unknown **ABANDONED WELLS** Unknown
WELL SPACING 1 well to every 4 acres (average)
SAND CHARACTERISTICS - The Third sand is a coarse-grained, pebbly sandstone. The Fourth is a white, pebbly sandstone, with a softer pay zone. Some Fourth sand wells have several pays which are separated by hard tight sand breaks. The top of the Fourth in some areas is very loose and is locally called a "Cloverseed Sand".

OPERATIONS - The field has been under vacuum for over 50 years. An unsuccessful small scale air-gas drive was tried.

REMARKS - Initial productions of the early wells were as high as 3,000 barrels per day, but the average was about 100 barrels. Salt water in variable amounts is found in both sands. The wells are pumped both by central power and individual gas engines. Some wells in local areas are flooded out by fresh water. Part of this field is in Butler County and is discussed in that section.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Shaw, E.W., and Munn, M.J., 1911 b, U.S. Geol. Survey, Bull. 454; data from present operators in the field.

ARMSTRONG COUNTY, PENNSYLVANIA

FIELD NAME Chicora FIELD No. 89

LOCATION Brady's Bend, Sugar Creek, West Franklin (see Butler County) Township
Armstrong (Butler) County Kittanning (Butler) Quadrangle

DISCOVERY DATE AND WELL 1873

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Third	1 616	1 940 000	485 000	50 000
Total	1 616	1 940 000	485 000	50 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Third	1600	30	6	6-1/4, 5-3/16	800, 1500

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING Varies from 1 well per acre to 1 well per 8 acres

SAND CHARACTERISTICS - The Third sand has a variable composition. It ranges from a fine- to a coarse-grained sandstone with a softer pay streak.

OPERATIONS - About 40 years ago an accidental introduction of gas into the Third sand increased production from one well. A Speechley sand gas well was shut in and a well about 3,000 feet away showed an increase in production. The field has been under vacuum for over 60 years.

REMARKS - Initial productions originally averaged 100 barrels per day. Very little salt water is encountered in the Third sand.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

ARMSTRONG COUNTY, PENNSYLVANIA

FIELD NAME Parker (includes Rattlesnake field) **FIELD No.** 81
LOCATION Hovey, Perry (Parker and Allegheny) Town
Armstrong (Butler) County Foxburg (Hilliards) Quadra
DISCOVERY DATE AND WELL 1869

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Third	2 649	10 600 000	2 650 000	265 000
First (Rattlesnake)	961	1 920 000	480 000	48 000
Total	3 610	12 520 000	3 130 000	313 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Third	800 to 1400	30	20	5-5/8 in early wells,	250
First	900	17	10	6-1/4 recently	500

PRODUCING WELLS Unknown **ABANDONED WELLS** Unknown
WELL SPACING 1 well to every 4 acres (average)
SAND CHARACTERISTICS - The Third is a white sand and varies from a broken, shaley, coarse-grained sandstone to a loosely cemented, pebbly sandstone. The First sand is a coarse-grained pebbly sandstone.

OPERATIONS - Vacuum has slightly increased the production of oil in the Third sand. The field also has responded to gas drive. In the Rattlesnake field secondary recovery has never been tried.

REMARKS - About 75 percent of the field is inactive. Initial productions from the Third sand ranged from 35 to 1,000 barrels per day. About 1 barrel of salt water is produced with each barrel of oil. The wells are pumped by jacks using a central power plant. In the Rattlesnake field the best well had an initial production of 25 barrels per day. The oil to water ratio is about 1 to 7. Some wells on the western side of the field are watered out with fresh water. The water production decreases with the oil production until the wells stop producing. A small portion of this field is in Clarion County and is discussed on this page. The remaineder of the field is in Butler County and is discussed in the Butler County section.
REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Shaw, E.W., and Munn, M.J., 1911a, U.S. Geol. Survey, Bull. 454; data from present operators in the field.

BEAVER COUNTY, PENNSYLVANIA

ELD NAME Brenner FIELD No. 112

OCATION New Sewickley Township
laver County Sewickley and Zelienople Quadrangle

SCOVERY DATE AND WELL 1895, Hill Brenner #1, Initial production - 75 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
ndred Foot	618	1 240 000		(very little)
Total	618	1 240 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
ndred Foot	1300	60	10	8-1/4, 6-1/4, 5	21, 525, 1275

ODUCING WELLS 1 ABANDONED WELLS About 75

ELL SPACING About 500 feet between wells

ND CHARACTERISTICS - The Hundred Foot sandstone is a hard, medium-grained ndstone, with a shale break 1 to 20 feet in thickness near the center. Within is sandstone occur lentils of a softer, more porous conglomeratic sandstone. e first couple of feet is hard. The next 10 feet are a softer, sugar pay sand. der the pay, the sand is hard until near bottom when it becomes broken and shaly.

PERATIONS - Secondary recovery operations have never been tried in this field. e sand is not flooded with fresh water.

EMARKS - The oil pay is found at the top of the sand. Salt water is pumped with he oil. The wells were not very large but produced enough to be profitable. Production is spotted in this field. As many as three pay zones are found in some ingle wells. The ratio of water to oil varies from 1:1 to 1:4. The largest initial production was over 100 barrels per day and the average from 15 to 20 barrels er day.

EFERENCE - Munn, M.J., 1911a, U.S. Geol. Survey, Geol. Atlas 176; data from former perator in the field; unpublished data from the files of the Pa. Geol. Survey.

BEAVER COUNTY, PENNSYLVANIA

FIELD NAME Carson FIELD No. 109
LOCATION Hanover Township
Beaver County Beaver Quadrang
DISCOVERY DATE AND WELL 1901, Sam Carson #1, Initial production - 5 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Berea	100			
In Penna. about	30	60 000	9 000	1 000
Total	30	60 000	9 000	1 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Berea	1300	25	10	6-1/4	1000

PRODUCING WELLS 15 in Pa. (total 35) ABANDONED WELLS Total 18
WELL SPACING About 400 feet between wells
SAND CHARACTERISTICS - The Berea sand is a gray to white, fine- to coarse-grained sandstone. Some pebbles are 1/2 inch in length. Generally, there are about 8 feet of good sand, a 5 foot break of poor sand and then about 4 feet more of good sand.

OPERATIONS - An air-gas drive project is in operation in this field. It was started in 1936 when the average daily production per well was 1 barrel per day. The production was doubled due to the air-gas drive.

REMARKS - The wells are pumped with jacks and central powers. The initial productions of the early wells were as high as 100 barrels per day. They varied from 5 to 100 barrels a day per well. The wells produced some water. The water to oil ratio varied from 1:1 to 3:1. About 70 acres of this field is in West Virginia but only that which is in Pennsylvania is discussed here.

REFERENCE - Data from present operators in the field.

BEAVER COUNTY, PENNSYLVANIA

ELD NAME Cookson FIELD No. 114

CATION Economy Township

eaver County Sewickley Quadrangle

SCOVERY DATE AND WELL 1890, Cookson #1, Initial production - 5 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
ndred Foot	231	370 000		
Total	231	370 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
ndred Foot	1200 to 1600	80 below break	8	8-1/4, 6-1/4	250 650

RODUCING WELLS None ABANDONED WELLS 30

ELL SPACING About 400 feet between wells

AND CHARACTERISTICS - The Hundred Foot sand is generally gray or white above e parting and white, blue, or dark below it. The sand is as a rule of medium exture, but in its mass occur thin, irregular lenses of coarse conglomeratic nd composed largely of pebbles of white or yellow quartz.

PERATIONS - Vacuum was on the sand from 1904 to 1945. This increased the pro- uction tenfold in open sand wells. The sand is not flooded with fresh water. ir or gas drive has never been tried.

EMARKS - The wells were pumped by individual gas engine units. The largest pro- ucer produced 200 barrels per day while the average was 25 to 30 barrels. Wells n this field produced very little salt water at first. In later years, the wells ncreased their production of salt water until no oil was produced and the wells roduced about 3 barrels of water per day. The big excitement started in 1898. ccording to Pa. Geol. Survey, 4th Ser., Bull. M19, this field was discovered in 877.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National De- ense (Unpublished); Munn, M.J., 1911a, U.S. Geol. Survey, Geol. Atlas 176; data rom present operators in the field.

BEAVER COUNTY, PENNSYLVANIA

FIELD NAME Crows Run (includes Dunn field) FIELD No. 113
LOCATION Economy, New Sewickley (Marshall) Town
Beaver (Allegheny) County Sewickley Quadra
DISCOVERY DATE AND WELL July 1900, Wallace #2, Initial production - 1500 barrels dail

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	1 678	5 030 000	1 260 000	126 000
Total	1 678	5 030 000	1 260 000	126 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1300 to 1800	80	15	6-1/4, 5	500 1400

PRODUCING WELLS 14 ABANDONED WELLS 221
WELL SPACING About 300 feet between wells
SAND CHARACTERISTICS - The Hundred Foot is a fine to pebbly sandstone with a shale break on top. The pay is usually pebbly or very coarse sand. Pebbles range from 3/10 to 2 inches in length. Commonly there are two pays. The upper pay, in the top of the sand is about 8 feet thick and the lower pay about 20 feet in the sand is about 7 feet thick. The second pay is below the break.

OPERATIONS - Vacuum was used for sometime and increased the production a little. Air or gas drive has never been tried in this field. For an intense air-gas drive to operate in this field, new wells would have to be drilled and the sand dewatered. It is doubtful if the increased production from the drive would offset the cost of drilling and dewatering.

REMARKS - The wells are pumped with individual gas pumping units. The connate water in the producing sand varies from dry to a greater water production than oil. Water is generally found below the pay zone. Water has flooded two-thirds of the field from the northern end toward the south. The best wells yielded from 300 to 500 barrels of oil per day. The report includes the Dunn field. The entire field is discussed here.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Munn, M.J., 1911a, U.S. Geol. Survey, Geol. Atlas 176; data from present operators in the field.

BEAVER COUNTY, PENNSYLVANIA

FIELD NAME Economy - Legionville (includes Craig and Davis fields) FIELD No. 115
LOCATION Harmony and Economy Township
Beaver County Sewickley Quadrangle
DISCOVERY DATE AND WELL 1885, Ludwig well

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	984	1 180 000	290 000	15 000
Boulder	143	230 000	57 000	2 000
Total	1 127	1 410 000	347 000	17 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1300 to 1700	25	6	8-1/4,	250,
Boulder	1500 to 1900	10	8	6-5/8	700

PRODUCING WELLS 15 ABANDONED WELLS 160
WELL SPACING 500 feet between wells
SAND CHARACTERISTICS - The Hundred Foot sand is generally gray or white, medium-grained, but in the bed occur thin, irregular lenses of coarse conglomeratic sand composed largely of pebbles of white or yellow quartz. The Boulder sand is a fine-grained sandstone.

OPERATIONS - This field was under vacuum for a few years and it increased the production about 15 percent. Repressuring has never been tried in this field. This field has not been flooded with fresh water.

REMARKS - Wells are pumped by individual gas engine units. The early wells had large, initial productions in the Hundred Foot sand. One well produced 2400 barrels per day. Considerable connate water is produced with the oil. The pay in the Hundred Foot sand usually occurs from the top of the sand to 10 feet in the sand. The Boulder sand wells were never very large producers. No water is found in the Boulder sand. Wells produce about 1/2 barrel per day at present. According to Pa. Geol. Survey, 4th Ser., Bull. M19, the Economy field was discovered in 1876.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Munn, M.J., 1911a, U.S. Geol. Survey, Geol. Atlas 176.

BEAVER COUNTY, PENNSYLVANIA

FIELD NAME Florence FIELD No. 144
LOCATION Hanover (Hanover) Towns
Beaver (Washington) County Burgettstown Quadrar
DISCOVERY DATE AND WELL 1899

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	327	500 000	120 000	12 000
Total	327	500 000	120 000	12 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1900	13 to 20	8	10, 8-1/4, 6-5/8, 4-7/8	50 600 1100 1300

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 600 to 1000 feet
SAND CHARACTERISTICS - The sand varies from fine- to coarse-grained with the pay being coarse and pebbly. In some places the sand has a pay in the top and one in the bottom. These are separated by a hard, tight sand zone.

OPERATIONS - Air or gas repressuring has been tried at 500 p.s.i. but no satisfactory results were obtained. Additional projects should be tried before it can be said that secondary recovery will not work.

REMARKS - The initial productions in most wells were about 15 barrels but some were as high as 100 barrels per day. Very little salt water has been encountered. About 80 percent of the field is inactive. No known fresh water flooding out of the wells exists. Most wells are pumped by individual gas engines but a few are pumped by gasoline engine pumping jacks. Part of this field is in Washington County and is discussed in that section.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Shaw, E.W., Munn, M.J., 1911a, U.S. Geol. Survey, Geol. Atlas 177; data from present operators in the field.

BEAVER COUNTY, PENNSYLVANIA

ELD NAME Harbinson Hollow FIELD No. 106
)CATION College, Hillboro and Chippewa Township
eaver County New Castle Quadrangle
ISCOVERY DATE AND WELL 1904

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ... (bbls.)	Recoverable by primary methods (bbls.)
rea	174	350 000		
Total	174	350 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
rea	700	35	10	6-1/4	400

RODUCING WELLS Unknown ABANDONED WELLS About 40
ELL SPACING About 400 feet between wells
AND CHARACTERISTICS - The Berea sand is a light-gray to white, quartzose rock f fine, even texture though locally reported pebbly. The pay streaks commonly ccur at about 20 feet in the sand.

PERATIONS - No secondary recovery methods have been tried. The sand probably ontains too much water for successful secondary recovery operations.

EMARKS - The best well was Gailey, Figley and Ferguson's No. 3 on the Boyd Lease nd made 55 barrels of oil and 1 barrel of water daily. Others made up to 20 barrels f oil with water up to 10 barrels. After one year many wells were abandoned. The roduction of oil decreased and the water production increased with the life of the ell. The pay streak is 15 to 20 feet below the top of the sand. The field has een limited by dry holes.

EFERENCE - DeWolf, Frank W., 1929, Pa. Geol. Survey, 4th Ser., Bull. A5.

BEAVER COUNTY, PENNSYLVANIA

FIELD NAME Hookstown FIELD No. 108
LOCATION Greene Towns
Beaver County Beaver Quadrar
DISCOVERY DATE AND WELL 1889, Jim Calhoon #1, Initial production - 600 barrels dai

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Berea	1 220	1 440 000		(very little)
Total	1 220	1 440 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Berea	1200	15	6	8-1/4, 6-1/4	300 900

PRODUCING WELLS 5 ABANDONED WELLS 400
WELL SPACING About 400 feet between wells
SAND CHARACTERISTICS - The Berea sand varies from a gray to white, fine-grained, compact sandstone to a coarse-grained, pebbly sandstone. The pay zone of the sand occurs in the coarse part of the sand.

OPERATIONS - A considerable part of this field has been depleted by an accidental water flood. This occurred in the coarse part of the sand where the water advanced rapidly through it. In this same general area an air-drive project has been in operation. The production increased from 4 to 10 times. One experiment with vacuum was not successful.

REMARKS - About 98 percent of this field is inactive. The wells were pumped with jacks and a central power. In the early days no water was pumped with the oil. Later the wells started to produce water and the water production continued to increase. One well pumped 92 barrels of water to 8 barrels of oil. Average production is now about 1 barrel per day.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Ashley, George H., and Robinson, J. French, 1922, Pa. Geol. Survey, 4th Ser., Bull. M1, vol. 1; Woolsey, L.H., 1905, U.S. Geol. Survey, Geol. Atlas 134; data from present operators in the field.

BEAVER COUNTY, PENNSYLVANIA

ELD NAME Kendall (includes Swearingen and Pumkin Hollow) FIELD No. 110

OCATION Hanover Township
aver County Beaver and Wellsville Quadrangle

SCOVERY DATE AND WELL 1914, Buchannon #1, Initial production about 5 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
erea	300	360 000	45 000	5 000
Total	300	360 000	45 000	5 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
erea	1250	25	6	6-1/4	600 to 1000

RODUCING WELLS 10 ABANDONED WELLS 150
ELL SPACING About 400 feet between wells
ND CHARACTERISTICS - The Berea sand varies from a gray to white, fine-grained, ompact sandstone to a coarse-grained sandstone.

PERATIONS - In the same general area an air-drive project on the Nicholls Farm as increased the oil production from 4 to 10 times. After 5 years of repressuring 20 wells made 500 barrels a month. This project has had some corrosion, valve nd emulsion trouble but it is not considered serious. Vacuum has never been tried n this field.

EMARKS - Original initial productions averaged 20 barrels per day. Now the average production is about 1/2 barrel per day. This sand has been subjected to fresh ater intrusion from poor casing or poorly plugged wells which spoiled part of the ield while other areas were not affected. In Pumkin Hollow an early well had an nitial production of 150 barrels per day. Wells are pumped with jacks and a central power. The best part of the field is inactive.

EFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from former operator in the field.

BEAVER COUNTY, PENNSYLVANIA

FIELD NAME New Galilee (includes Madden Run, Elder and Purdy) **FIELD No.** 105
LOCATION Darlington and Big Beaver **Townsh**
Beaver **County** New Castle **Quadrang**
DISCOVERY DATE AND WELL New Galilee - 1886; Purdy - 1904, Fergus and Johnson well, initial production - probably 1 barrel daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Berea (Purdy Field)	667	2 000 000	200 000	20 000
Lower Conno-quenessing	62	120 000	30 000	3 000
Total	729	2 120 000	230 000	23 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Berea	600 to 700	40	15	6-1/4	400
Lower Conno-quenessing	450	40	10		

PRODUCING WELLS 60 **ABANDONED WELLS** 200
WELL SPACING 300 to 400 feet between wells
SAND CHARACTERISTICS - The Berea is a light gray to white, quartzose rock of fine, even texture though locally reported pebbly. The first pay lies 10 to 15 feet below the top of the sand, and a second pay 30 feet below the top. The pay zone is softer than the rest of the sand. The Lower Conoquenessing is a massive sandstone. The first pay lies 4 to 15 feet in the sand and the second pay at the bottom of the sand.

OPERATIONS - Secondary recovery methods were never tried in this field.

REMARKS - The Berea is so saturated that 10 to 20 barrels of water are pumped before any oil is obtained. The best well had an initial production of 7 barrels per day of oil but settled to 3-1/2 barrels. General initial productions were 2-1/2 to 5 barrels of oil per day. Water to oil ratio is about 10:1. Parts of this field might re-pressure or water flood where the sand is fairly free from connate water. The initial productions of wells in the Purdy field ranged from 5 to 15 barrels per day. The largest well had initial production of 65 barrels per day. The sand is wet at the bottom and, hence, not drilled through.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); DeWolf, Frank W., 1929, Pa. Geol. Survey, 4th Ser., Bull. A5.

BEAVER COUNTY, PENNSYLVANIA

FIELD NAME Shannopin **FIELD No.** 111

LOCATION Independence, Hopewell, Findley (Findley) **Township**
Beaver (Allegheny) **County** Beaver **Quadrangle**

DISCOVERY DATE AND WELL 1883

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Indred Foot	3 933	7 900 000	2 000 000	200 000
Total	3 933	7 900 000	2 000 000	200 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Indred Foot	1400 to 1300	30	10	8-1/4, 6-1/4	200 1050

PRODUCING WELLS 35 **ABANDONED WELLS** 500

WELL SPACING 500 feet between wells

SAND CHARACTERISTICS - The upper portion of this sand is hard, siliceous and perhaps impervious, while the lower part, or pay, is an open, sugary or pebbly sand, some pebbles as long as 1 inch. In the northern end of the field two pays occur. The pay is 5 feet in the sand and the second pay is about 20 feet in the sand. In the southern end of the field only the bottom pay is found.

OPERATIONS - Vacuum has been on the field since 1913. The vacuum trippled the production. At the present time, a gas cycle is used in which the gas under a line pressure of 10 p.s.i. is introduced into an input well with a vacuum being pulled at the producing wells. This project doubled the production. Repressuring would probably be successful in this field, but the thin pay and cost of new wells precludes any redrilling.

REMARKS - Most of this field is now inactive. Wells pump very little water in the northern part of the field while about 1/3 of the field in the southern part has been watered out. The largest well was the Marks well, in 1886, which produced 3800 barrels a day. The wells are pumped by individual gas engine units. The entire field is discussed here.

REFERENCE - Anonymous, 1911, Report to the Petroleum Coordinator for National Defense (Unpublished); Ashley, George H., and Robinson, J.French, 1922, Pa. Geol. Survey, 4th ser., Bull. M1, vol. 1; Woolsey, L.H., 1905, U.S. Geol. Survey, Geol. Atlas 134; data from present operators in the field.

BEAVER COUNTY, PENNSYLVANIA

FIELD NAME Smith's Ferry **FIELD No.** 107
LOCATION Ohio and Industry **Town**
Beaver **County** Beaver **Quadra**
DISCOVERY DATE AND WELL December 1860, Messrs. Pattens, Finlens, Swan & Co. well on the Thompson farm.

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Berea	3 040	7 100 000	1 000 000	150 000
Total	3 040	7 100 000	1 000 000	150 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Berea	1000	30	10	5-3/16	650

PRODUCING WELLS About 50 **ABANDONED WELLS** Over 2000
WELL SPACING From town lot to 500 feet
SAND CHARACTERISTICS - The Berea sandstone varies from a blue, hard, fine-grained sandstone to a grayish-white, fine-grained sandstone. The first 10 feet of sandstone is generally hard and blue, then occurs 10 feet of pay sand which is fine and grayish white in color. The lower 10 feet of sand is hard and blue. Some times a second pay occurs from 23 to 25 feet in the sand.

OPERATIONS - Vacuum was used on a couple of leases and helped the production to some extent. Natural floods worked in the field from improperly plugged wells. This flood increased the production of the wells for about 1 year and then the wells were flooded out.

REMARKS - In the early days the initial productions were up to 100 barrels of oil per day. The average initial production was from 1 to 2 barrels of oil per day. Very litt gas was found in this field and the wells did not flow. In the early 1900's the wells made about 4,000 cu. ft. of gas. The water to oil ratio is about 3 to 1. Some of the wells were abandoned due to fresh water intrusion while others produced very little oil and were abandoned. The wells are now pumped with jacks and central power. Production in this field is rather spotty. Some wells had a show of oil in an upper sand called the Salt sand.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Ashley, George H., and Robinson, J. French, 1922, Pa. Geol. Survey, 4th Ser., Bull. M1, vol. 1; White, I.C., 1878, Pa. 2nd Geol. Survey, Rpt. Q.; Woolsey, L. H., 1905, U.S. Geol. Survey, Geol. Atlas 134; data from former operators in the field.

BUTLER COUNTY, PENNSYLVANIA

ELD NAME Alameda Park - Crooked Run FIELD No. 90

LCATION Butler and Center Township
Butler County Butler Quadrangle

ISCOVERY DATE AND WELL Alameda Park - 1900, Frazier #1; Crooked Run - 1860

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
ndred Foot	85	140 000	30 000	3 000
ird	135	135 000	34 000	
Total	220	275 000	64 000	3 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
ndred Foot	1300	70	8	6-1/4	750
ird	1550 to 1700	16	5	6-1/4	600

ODUCING WELLS 5 ABANDONED WELLS 38

ELL SPACING About 400 feet between wells

ND CHARACTERISTICS - The Hundred Foot sand varies from a light gray to white, ne- to a coarse-grained sandstone. The Third sand varies from dark gray to ght gray in color and from a fine to a coarse-grained sandstone with grains 1/5 ch long.

PERATIONS - Secondary recovery has never been tried in this field.

EMARKS - The wells are pumped with individual gas engine units. The Crooked Run ield produces from the Hundred Foot sand and at present has 5 producing wells which verage about 1/2 barrel of oil per well per day. The Alameda Park field produced rom the Third sand and wells in this field have all been abandoned. Initial pro- uctions have been reported up to 50 barrels per day for some wells in the early ays. At least one well had initial production of 22 barrels per day. The wells veraged about 1 barrel a day of salt water.

EFERENCE - Data from former operators in the field; unpublished data from the iles of the Pa. Geol. Survey.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Annisville - Ferris FIELD No. 84
LOCATION Venango and Washington Town
Butler County Hilliards Quadra
DISCOVERY DATE AND WELL 1916

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
First	840	3 000 000	560 000	56 000
Total	840	3 000 000	560 000	56 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
First	850	50	12	6-1/4	400

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 400 feet between wells
SAND CHARACTERISTICS - The First sand consists of two pay zones in the upper part of the sand body. Each pay is 6 to 7 feet thick. These pay sands are separated by about 6 feet of "tight", non-productive sandstone and are underlain by an 8 foot stratum of coarse pebbly water-bearing sandstone. The bottom 10 feet of the sand are hard and non-productive.

OPERATIONS - Secondary recovery methods have not been tried in this field.

REMARKS - The wells are pumped with jacks and central powers. Early wells produced up to 25 barrels of oil and 75 to 100 barrels of salt water daily. The present average daily well production is about 1/5 of a barrel of oil. Over half of the area is inactive. The First sand is water-bearing over most of the Hilliards Quadrangle.

REFERENCE - Sherrill, R. E., and Matteson, L. S., 1939, Pa. Geol. Survey, 4th Ser., P.R. 122.

BUTLER COUNTY, PENNSYLVANIA

ELD NAME Bakerstown FIELD No. 117

OCATION Middlesex, Clinton (Richland and West Deer) Township

Itler County New Kensington Quadrangle

ISCOVERY DATE AND WELL 1888, Gold #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
ird	1 919	2 680 000	670 000	67 000
Total	1 919	2 680 000	670 000	67 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
ird	1800	25	7	10, 8-1/4, 6-5/8	250, 900, 1500

ODUCING WELLS 50 ABANDONED WELLS 200

ELL SPACING About 400 feet between wells

ND CHARACTERISTICS - The Third sand is usually hard and fine-grained with the y streak not much softer than the main sand body. In places the Third sand is dium coarse-grained with soft pay streaks. The sand in this area is sometimes parated by a shale break and when that occurs the upper part is called the Third d the lower part is called the Fourth. Occasionally there are 2 pay zones en- untered in this sand.

PERATIONS - A small scale gas drive project has been in operation in this field r about 15 years. Some of the producing wells trippled their production as a re- lt of the gas drive. This project has been economically operated. Secondary re- very in this field looks promising except that most of the old wells have been andoned and new wells would have to be drilled.

EMARKS - The wells are pumped with jacks and central powers as well as individ- l gas engine units. The Hundred Foot sand in this area contains a large amount water. Initial productions of the early wells were as high as 1000 barrels per y. About 90 percent of this field is inactive. Part of the field is in Allegheny unty and will be discussed in that section.

EFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National De- nse (Unpublished); Richardson, G.B., 1932, U.S. Geol. Survey, Bull. 829; data from resent operators in the field.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Brownsdale - Meharg FIELD No. 97
LOCATION Forward, Penn, Jefferson and Summit Town
Butler County Butler Quadra
DISCOVERY DATE AND WELL 1892, Campbell well, Initial production - 125 barrels dai

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	1 174	2 348 000	587 000	59 000
Third	2 596	5 711 000	1 428 000	143 000
Total	3 770	8 059 000	2 015 000	202 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1400	100	10	6-1/4, 4-1/4	550, 1300
Third	1600 to 1900	20	11	6-1/4, 4-1/4	550, 1500

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 400 feet between wells
SAND CHARACTERISTICS - The Hundred Foot is a massive, fine- to medium coarse grained sandstone. Usually a softer pay zone occurs and sometimes a coarse pebbly pay. The pay generally occurs about 30 to 35 feet in the sand and is found above the break in the sand. The Third sand generally consists of 10 to 12 feet of grayish pebbly sand. Under this, about 2 feet of hard white sand is encountered and then 8 feet of good brownish, pebbly sugar sand.

OPERATIONS - A project with one input well was tried. Gas was injected and after a short time the gas blew through to another well. The project was abandoned. With proper operating procedures, air or gas drive probably would be successful.

REMARKS - The wells are pumped with individual gas engine units. Early initial productions ranged up to 300 barrels daily of oil. The Hundred Foot wells produced up to 200 barrels of water daily. In places the entire Third sand contained oil. The average present daily production is about 1 barrel of oil. When no pay is encountered in the bottom of the sand, the sand is white to blue in color, fine and hard.

REFERENCE - Richardson, G.B., 1936, U.S. Geol. Survey, Bull. 873; data from present operators in the field.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Bullion - Clintonville FIELD No. 69

LOCATION Marion, Venango (Clinton and Irwin) Township
Butler (Venango) County Hilliards (Franklin) Quadrangle

DISCOVERY DATE AND WELL About 1860, Martin well, Initial production - 1000 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Second	970	4 370 000	725 000	72 000
Third	1 200	5 400 000	900 000	60 000
Total	2 170	9 770 000	1 625 000	132 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Second	850 to 1250	28	10	6-1/4, 4-1/4	200 to 600,
Third	600 to 1300	15	10		750 to 1150

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING About 300 feet between wells

SAND CHARACTERISTICS - The Second sand varies from a fine-grained sandstone in the main field, to a coarse and pebbly sandstone in the small fields. The porosity is estimated at 20 percent with a permeability of less than 10 millidarcies over most of the main field and in the order of several hundred millidarcies in the small ones. The Third sand ranges from a uniform medium-grained sand to a conglomeratic sand. The porosity in the poorer parts of the field averaged 11 percent and higher in the better parts. The permeability ranges from less than one to 50 millidarcies in the finer, more uniform sand to 3,500 or more in the more open sand.

OPERATIONS - Air-gas drive projects have been successful in the Second and Third sands. A water flood project in the Second was not economically successful. For years vacuum has been applied successfully to the Third sand and is still in use on some of the leases.

REMARKS - The wells are pumped with jacks and central powers. Corrosion due to water in the basal Pennsylvania Coal Measures is so severe in some cases, that the 4-1/4 inch string must be cemented in or replaced every 2 or 3 years. One of the largest wells, the Rapp well, drilled about 1906, produced about 2000 barrels of oil daily. Some wells had initial productions of 3500 barrels of oil daily. Present initial productions of wells in this field are about 1 barrel of oil per day. About 1000 acres of Second sand are inactive. Most of this field lies in the Venango County Section and is discussed on that page.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Sherrill, R.E., and Matteson, L.S., 1939, Pa. Geol. Survey, 4th Ser., P.R. 122.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Butler Cross Belt FIELD No. 76
LOCATION Parker, Fairview (Perry and Bradys Bend) Town
Butler(Armstrong) County Hilliards, Foxburg, Butler and Kittanning Quadra
DISCOVERY DATE AND WELL 1870, J. L. Mildren well

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Third	8 500	17 000 000	4 250 000	425 000
Fourth	4 850	13 600 000	3 400 000	340 000
Total	13 350	30 600 000	7 650 000	765 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Third	1480	30	10	6-1/4	700
Fourth	1525	25	14		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 1 well to every 4 acres (average)
SAND CHARACTERISTICS - The Third sand is a coarse-grained, pebbly sandstone. The Fourth is a white, pebbly sandstone with the pay being softer. Some wells have several pay zones in the Fourth. These are separated by hard, tight sand breaks. The top of the Fourth in some areas is very loose and is locally called a "cloverseed" sand.

OPERATIONS - Many of the wells have had vacuum on both sands for over 50 years. Repressuring with gas and air has been tried near Fairview but was not very successful.

REMARKS - Initial productions of the early wells were as high as 3000 barrels per day, but the average was about 100 barrels. Saltwater in variable amounts is found in both sands. The wells are pumped both by central power and individual gas engines. Some wells in local areas are flooded out by fresh water. Part of this field is in Armstrong County and is discussed in that section.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Shaw, E. W., and Munn, M. J., 1911 b, U.S. Geol. Survey, Bull. 454; data from present operators in the field.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Byram (extension of Emlenton-Richey Run Field) **FIELD No.** 78

LOCATION Allegheny Township
Butler County Hilliards Quadrangle

DISCOVERY DATE AND WELL 1878

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Byram	1 868	5 600 000	1 120 000	112 000
Third	847	3 390 000	544 000	54 000
Total	2 715	8 990 000	1 664 000	166 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Byram	1250	10	10	6-1/4	400
Third	1280	25	10		

PRODUCING WELLS Unknown **ABANDONED WELLS** Unknown
WELL SPACING About 400 feet between wells

SAND CHARACTERISTICS - The Byram sand is a brownish-gray, soft, fine-grained sand in which pebble streaks occur locally. Apparently the entire sand thickness is pay sand. The Third sand consists of a gray, hard, fine, shaly sandstone with three coarse pebble pays. The top pay is about 7 to 14 feet in the sand, the next pay is from 17 to 21 feet in and the bottom pay from 25 to 28 feet in the sand.

OPERATIONS - Vacuum has been used with success on some of the leases. Gas drive has tried in this field but no information is available on this project.

REMARKS - The wells are pumped with jacks and a central power. The initial productions of the early wells were up to 35 barrels daily. The average production of wells today is about 1/8 of a barrel daily. Very little saltwater is encountered in this sand. The Boulder sand is spotty in production in this area. Some wells in the Third sand had initial productions as high as 500 barrels of oil daily.

REFERENCE - Shaw, E. W., and Munn, M. J., 1911 b, U. S. Geol. Survey, Bull. 454; Merrill, R. E., and Matteson, L. S., 1939, Pa. Geol. Survey, 4th Ser., P. R. 122.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Callery - Watters (includes Ramsey and Lockwood) FIELD No. 94
LOCATION Jackson, Cranberry, Forward and Adams Tow
Butler County Zelienople and Sewickley Quadr
DISCOVERY DATE AND WELL 1898, Irvine #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	2 525	5 050 000		
Total	2 525	5 050 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1400	90	10	6-5/8, 4-7/8	600, 1300

PRODUCING WELLS None ABANDONED WELLS Unknown
WELL SPACING About 500 feet between wells
SAND CHARACTERISTICS - The Hundred Foot sand is generally gray or white above the break and white, blue or dark below it. The sand is medium in texture, but in its mass occur thin, irregular lenses of coarse conglomeratic sand, composed largely of pebbles of white or yellow quartz. One to two pays are found in this sand. The first pay is found about 45 feet in the sand and the second is found in the bottom. The first is generally "cloverseed" sand and the second is a white, coarse sand. Pay thicknesses in some wells are as much as 50 feet.

OPERATIONS - Vacuum was tried in this field, but it did not increase the production. No other secondary method was tried. These fields have been flooded with water from sands above the Hundred Foot. Secondary recovery does not look favorable for this area. The field is completely inactive.

REMARKS - Wells were pumped in this field with individual gas engine units. The early initial productions were as high as 1200 barrels per day. The wells produced considerable salt water (about 200 barrels a day) and were pumped 24 hours a day. The Berea sand above the Hundred Foot contains a great deal of salt water and this water probably entered the Hundred Foot sand through leaking casing or poorly plugged holes and flooded the sand.

REFERENCE - Munn, M. J., 1911a, U.S. Geol. Survey, Geol. Atlas 176; Richardson, G. B., 1936, U. S. Geol. Survey, Bull. 873; data from former operator in the field.

BUTLER COUNTY, PENNSYLVANIA

LD NAME Cherry Valley FIELD No. 77

CATION Venango and Allegheny Township

tler County Hilliards Quadrangle

SCOVERY DATE AND WELL 1879

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
cond	2 640	7 260 000	1 160 000	116 000
Total	2 640	7 260 000	1 160 000	116 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
cond	1100	36	11	6-1/4	400

ODUCING WELLS Unknown ABANDONED WELLS Unknown

LL SPACING About 300 feet between wells

ND CHARACTERISTICS - The lower one-half or more of the Second sand body is ne-grained and productive in only a few wells. The upper part of the sand is ry coarse-grained to pebbly and constitutes the main pay sand. This pay sand nges from 5 to 23 feet and averages 11 feet in thickness. Locally it is over- in by thin conglomerate lenses containing disc-shaped pebbles up to 1 inch or re in diameter.

ERATIONS - A gas drive project in this area has been successful.

MARKS - The wells are pumped with jacks and a central power. The initial pro- uctions of the early wells ranged up to 50 barrels of oil daily. A great deal this field is inactive. The present average daily production of the wells is out 1/8 of a barrel.

FERENCE - Sherrill, R. E., and Matteson, L. S., 1939, Pa. Geol. Survey, 4th Ser., . R. 122.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Chicora FIELD No
LOCATION Summit, Clearfield, Donegal, Oakland, Fairview (see Armstrong County
Butler (Armstrong). County Butler and Kittanning
DISCOVERY DATE AND WELL 1873

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable primary meth (bbls.)
Third	7 400	8 880 000	2 220 000	222 00(
Fourth	5 000	8 000 000	2 000 000	200 00(
Total	12 400	16 880 000	4 220 000	422 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length casing (ft
Third	1600	30	6	6-1/4,	700,
Fourth	1650	20	8	6-5/8	1500

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING Varies from 1 well per acre to 1 well per 8 acres
SAND CHARACTERISTICS - The composition of the Third sand is variable and ranges from a fine- to coarse-grained sandstone with a softer pay zone. The Fourth sand is white and coarse-grained.

OPERATIONS - Repressuring with gas in the Third sand has been tried in several local areas. In one case, production was more than doubled for some time. The field has been under vacuum for over 60 years.

REMARKS - The initial production of one well was 1200 barrels per day with the average of the field being about 180 barrels per day. The Third and Fourth have very little saltwater. However, some comes in from the Hundred Foot sand above. The ratio of water to oil is about 1 to 4. The Third sand is flooded out with fresh water in some areas. The wells are pumped by jacks, powered by a central power plant.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

BUTLER COUNTY, PENNSYLVANIA

Crider - Duncan FIELD No. 100

ON Cranberry Township

County Sewickley Quadrangle

ERY DATE AND WELL 1893

RESERVE ESTIMATE AS OF JANUARY 1, 1947

ducing ands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive	(bbls.)	Recoverable by primary methods (bbls.)
d Foot	100	120 000	30 000		3 000
	667	800 000	200 000		20 000
	436	523 000	131 000		13 000
Total	1 203	1 443 000	361 000		36 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
ired Foot	1350	100	6	8, 6-5/8,	50, 650,
e	1650	12	6	8, 6-5/8, 5-3/16	50, 650, 1600
lder	1700	22	6	8, 6-5/8, 5-3/16	50, 650, 1600

DDUCING WELLS Unknown ABANDONED WELLS Unknown

LL SPACING About 600 feet between wells

ND CHARACTERISTICS - The Hundred Foot sand is a coarse "clover seed" sand on , changing to a white sugar sand. The pay is in the white sugar sand about 32 t below the top. Occasionally another pay is encountered about 90 feet in the d. The sand, other than pay is dark and broken. The Snee sand is a white to y medium-grained sandstone. The Boulder sand is a chocolate colored fine-ained sandstone.

ERATIONS - Secondary recovery operations have not been tried in this field. e Hundred Foot sand in the Duncan field has been flooded with fresh water and e wells are now cased through the Hundred Foot sand. The northern end of the ider field might have some fresh water in the sands.

MARKS - The wells are pumped with individual gas engine units. Initial produc-ons of wells in the early days were up to 500 barrels per day. Initial productions the Snee sand were up to 40 barrels daily. Snee sand wells produce very little, t some are up to 1/2 barrel daily at present. The present production of Hundred ot wells average 2/3 of a barrel daily of oil and about 9 barrels of water. The ee and Boulder sand wells produce about 1 barrel of water per week.

FERENCE - Munn, M. J., 1911a, U. S. Geol. Survey Geol. Atlas 176; data from esent operators in the field.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Evans City - Glade Run **FIELD No.** 93
LOCATION Forward and Jackson **Town**
Butler **County** Zelienople and Butler **Quadrar**
DISCOVERY DATE AND WELL Evans City - March 26, 1915, Kreitsburg well, Initial production - 20 barrels daily; Glade Run - 1886

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	649	2 070 000	520 000	52 000
Third	2 620	4 200 000	2 100 000	210 000
Total	3 269	6 270 000	2 620 000	262 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1200	100	16	6-1/4,	600,
Third	1400	30	8	6-1/4, 4-1/4	600, 1200

PRODUCING WELLS Unknown **ABANDONED WELLS** Unknown
WELL SPACING About 400 feet between wells
SAND CHARACTERISTICS - The Hundred Foot sand usually contains one or more bands of shale. The upper 20 feet or so of sand is reported to be black and to be underlain by white sand. The pay is coarse and pebbly, which is described as "open" and "soft". The Third sand is a gray, fine-grained sandstone, composed of rounded and sem-rounded grains of quartz and feldspar and flakes of sericite in a clayey matrix. Some samples of the sand are medium to coarse-grained, composed of larger grains and small pebbles of quartz, as much as 1/5 inch in diameter. Often there are two soft, open, sugary pay streaks.

OPERATIONS - Secondary recovery operations have not been tried in this area. The Glade Run field, which produces from the Third sand, is flooded out by water from some of the upper sands through poorly plugged wells.

REMARKS - The wells are pumped with individual gas engine units. In the Glade Run field the largest well produced 6000 barrels the first day. In the Evans City field the largest well had an initial production of 1250 barrels a day. The Third sand is lenticular and ranges from less than 1 foot to 51 feet in thickness. In some wells the pay was 34 feet thick. Most of the oil in this field came from the Third sand, but some of it came from the Hundred Foot. The Third sand in the Evans City field is reported to be free from water. According to Pa. Geol. Survey, 4th Ser., Bull. M19, the Evans City field was discovered in 1892.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Richardson, G. B., 1936, U. S. Geol. Survey, Bull. 873.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Garvin (includes Dumbaugh field) FIELD No. 101

LOCATION Cranberry Township
Butler County Sewickley Quadrangle

DISCOVERY DATE AND WELL 1893, B. W. Garvin well, Initial production - 200 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive _____ (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	835	1 670 000		
Total	835	1 670 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1400	105	10	6-5/8, 4-7/8	500 1300

PRODUCING WELLS None ABANDONED WELLS 100

WELL SPACING About 600 feet between wells

SAND CHARACTERISTICS - The Hundred Foot sand consists of about 20 feet of dark sand at the top with gray or white sand below. The pays are composed of coarse sand and small quartz pebbles. The first pay is sometimes found near the top of the sand. The second pay is found from 55 to 70 feet below the top and ranges from 3 to 10 feet in thickness.

OPERATIONS - The field had vacuum on it for a short time. Repressuring was never tried in this field. The field has been flooded with fresh water and does not look promising for secondary recovery.

REMARKS - Wells in this field were pumped by jacks and central powers. The wells produced a lot of salt water. The water to oil ratio was sometimes 5 to 1. The field has been inactive since 1935.

REFERENCE - Munn, M. J., 1911a, U. S. Geol. Survey, Geol. Atlas 176; data from former operator in the field.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Harmony - Zelienople FIELD No. 91
LOCATION Jackson, Lancaster (Marion) Town
Butler (Beaver) County Zelienople Quadr
DISCOVERY DATE AND WELL About 1889

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	940	1 100 000		
Total	940	1 100 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1100 to 1400	50	6	6-1/4	1050

PRODUCING WELLS None ABANDONED WELLS All
WELL SPACING About 400 feet between wells
SAND CHARACTERISTICS - The Hundred Foot sand is usually a hard, fine-grained sand, variable in composition. The pay is commonly a coarse-grained pebbly bed which is "open" and "soft".

OPERATIONS - Secondary recovery operations were never tried. This field is completely watered out and does not look favorable for secondary recovery.

REMARKS - The wells were pumped with individual gas engine units. The initial production of the best well was 1,000 barrels daily. This was a town lot development. The sand was flooded and became inactive about 1902. Later, spotty production was obtained from the Boulder sand about 150 feet felow the Hundred Foot. Part of this field is in Beaver County but the entire acreage is discussed here. According to Pa. Geol. Survey, 4th Ser., Bull. M19, the Zelienople field was discovered in 1900.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Richardson, G. B., 1936, U. S. Geol. Survey, Bull. 873.

BUTLER COUNTY, PENNSYLVANIA

LD NAME Hooker FIELD No. 83

CATION Fairview and Concord Township

tler County Hilliards and Butler Quadrangle

COVERY DATE AND WELL 1901

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Third	2 200	8 800 000	1 500 000	125 000
Speechley	6 455	38 730 000	6 000 000	600 000
Total	8 655	47 530 000	7 500 000	725 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Third	1200 to 1500	20	12	6-1/4	550 to 630
Speechley	2150 to 2350	25	15		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING About 6 to 10 acres per well

SAND CHARACTERISTICS - The Third sand pay is medium- to fine-grained and generally lies in the upper part of the sand body. The Speechley sand is a chocolate colored, uniform, fine-grained, hard sandstone where productive.

OPERATIONS - A gas drive project was successful in the Third sand. Water flooding and repressuring have been attempted without success in the Speechley sand.

REMARKS - The wells are pumped with individual gas engine units. The initial daily productions of the wells were up to 75 barrels. The wells averaged about 2 barrels daily. The Speechley sand contains very little water. The present daily production is less than 1/4 barrel per well.

REFERENCE - Sherrill, R. E., and Matteson, L. S., 1939, Pa. Geol. Survey, 4th Ser., P. R. 122.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Hoover FIELD No. 82
LOCATION Washington and Concord To
Butler County Butler and Hilliards Quad
DISCOVERY DATE AND WELL 1892, Lackey well

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Third	2 000	8 000 000	1 300 000	100 000
Total	2 000	8 000 000	1 300 000	100 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Third	1200 to 1500	20	12	6-1/4	1100

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 1 acre per well
SAND CHARACTERISTICS - The Third sand is up to 30 feet in thickness. The pay sand is medium to fine-grained, generally lies in the upper part of the sand body and is up to 20 feet in thickness. The average porosity is about 10 percent with a permeability up to 56 millidarcies, but is less than 4 millidarcies for most of the sand.

OPERATIONS - Gas drive projects in the area have been successful.

REMARKS - The wells are pumped with jacks and central powers. Also some individual pumping units are used. Early wells produced up to 60 barrels of oil daily. Producers are bothered by the collection of paraffin in the well. Small quantities of water are produced with the oil. Part of this field has been flooded with fresh water which is moving southward.

REFERENCE - Sherrill, R. E., and Matteson, L. S., 1939, Pa. Geol. Survey, 4th Ser., P. R. 122.

BUTLER COUNTY, PENNSYLVANIA

ID NAME Jefferson Center - Herman FIELD No. 98

ATION Jefferson, Summit, Clearfield and Winfield Township

er County Butler Quadrangle

OVERY DATE AND WELL 1887

RESERVE ESTIMATE AS OF JANUARY 1, 1947

roducing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
th	4 365	6 984 000	1 746 000	175 000
Total	4 365	6 984 000	1 746 000	175 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
th	1800	30	8	6-1/4, 4-7/8	700, 1500

DUCING WELLS Unknown ABANDONED WELLS Unknown

L SPACING 350 feet between wells

D CHARACTERISTICS - The Fourth sand ranges from a white sugar sand to a dark ver seed sand in the pay zones and is white and hard where non-productive. Some oles occur and are up to 1/2 inch in length. A 3 to 8 foot shale break gener- y occurs near the bottom of the sand. The first pay zone occurs in the top of sand and sometimes a second pay zone occurs below the break about 20 feet in sand.

ERATIONS - One small gas drive project was tried with some success. The di- tion of the drive could not be determined before injection started. Production increased in wells on an adjoining lease. Gas drive probably would prove suc- sful, if a project was tried in an area where the sand was more uniform. Most the field was operated under vacuum for 15 to 20 years. Vacuum increased the duction a great deal.

MARKS - The wells are pumped with individual gas engine units. Initial produc- ns of early wells were up to 2500 barrels daily. Very little water was produced h this oil. Oil was produced from an area of about 25 acres from a sand between Boulder and Thirty Foot sands. The sand averaged about 6 feet thick and wells ducing from this sand had initial productions up to 100 barrels daily of oil and barrels of water. The sand is a white, fine-grained, hard sandstone.

ERENCE - Richardson, G. B., 1936, U.S. Geol. Survey, Bull. 873; data from pres- operators in the field.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Little Creek FIELD No. 92
LOCATION Lancaster, Conoquenessing, Jackson and Forward To
Butler County Zelienople Quad
DISCOVERY DATE AND WELL Hundred Foot - 1889; Snee - 1906, Rose #2, Initial production 15 barrels daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	4 620	14 800 000		
Snee	2 000	4 000 000	1 000 000	100 000
Total	6 620	18 800 000	1 000 000	100 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1100 to 1400	100	16	6-1/4,	600,
Snee	1200 to 1520	18	10	6-1/4, 4-1/4	600, 1400

PRODUCING WELLS 8 ABANDONED WELLS 500
WELL SPACING About 250 feet between wells

SAND CHARACTERISTICS - The Hundred Foot sand usually contains one or more bands of shale. One of these shale partings is 3 feet thick and occurs about 17 feet below the top of the sand. The upper 20 feet or so of sand is reported to be black sand and to be underlain by white sand. The pay is coarse and pebbly, which is described as "open and soft". Commonly there are two pay streaks. The Snee sand where productive has a coarse "clover seed" pay on top or a soft very white sugar sand pay which occurs near the middle of the sand. Where non-productive the sand is hard and blue.

OPERATIONS - Secondary operations have not been tried in this field. Accidental water floods in this area have shown no increase in production of oil. The Hundred Foot sand is flooded and does not look very promising for secondary recovery. Although the Snee sand produces a great deal of water, it might respond to repressuring.

REMARKS - The wells are pumped with individual gas engine units. Hundred Foot wells had initial productions ranging up to 1500 barrels daily. This sand has been entirely flooded with fresh water. The pay streaks in this sand contained salt water and oil and water were produced together. The Snee sand wells had initial productions up to 15 barrels a day and were long-lived. The water to oil ratio varied from 1:1 to 10:1. The top "clover seed" pay occurs most frequently. Spotty Boulder production is sometimes encountered.

REFERENCE - Richardson, G. B., 1936, U. S. Geol. Survey, Bull. 873; data from present operators in the field.

LD NAME Mars - Glade Mills - Valencia **FIELD No.** 99

CATION Adams, Middlesex (Pine and Richland) Township
ler (Allegheny) **County** Sewickley and New Kensington Quadrangle

COVERY DATE AND WELL 1890

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
dred Foot	3 463	5 540 000		139 000
Total	3 463	5 540 000		139 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
dred Foot	1400	120	8	10, 8-1/4, 6-5/8	200, 850, 1500

ODUCING WELLS 25 **ABANDONED WELLS** 450

LL SPACING About 400 feet between wells

ND CHARACTERISTICS - The Hundred Foot sand consists of 2 members separated a shale break in the middle of the formation. The sand is hard and fine-grained, h softer pay streaks. Generally there are 2 pay streaks and sometimes four. The er pay streak occurs about 20 feet in the sand and the lower streak about 50 feet ow the top of the sand, just below the shale break.

ERATIONS - Secondary recovery methods have not been tried in this field.

MARKS - The wells are pumped with individual gas engine units. Most of this eld has been flooded with fresh water except for a few isolated areas. The initial productions of early wells were as high as 100 barrels per day. The water oil ratio was as high as 10 to 1. The Fourth sand is spotty in production in is area. One well had an initial production of 50 barrels per day from an 11 ot pay streak. Part of this field is in Allegheny County, but it is covered tirely in this section. According to Pa. Geol. Survey, 4th Ser., Bull. M19, e Glade Mills field was discovered in 1876.

FERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Richardson, G. B., 1932, U. S. Geol. Survey, Bull. 829.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Muddy Creek FIELD No. 86
LOCATION Muddy Creek, Franklin and Brady To
Butler County Zelienople Quac
DISCOVERY DATE AND WELL 1889, Shaner, Initial production - about 4 barrels dail

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Berea	1 285	2 570 000	640 000	64 000
Total	1 285	2 570 000	640 000	64 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Berea	850 to 1150	15	10	6-1/4	600

PRODUCING WELLS About 160 ABANDONED WELLS About 200
WELL SPACING About 275 feet between wells
SAND CHARACTERISTICS - The Berea sandstone ranges from a dark gray, hard, fine-grained sandstone, to a coarse-grained sandstone. The oil pay is found in the upper part of the sand. If a coarse sand is found in the bottom of the sandstone, fresh water is usually encountered.

OPERATIONS - Vacuum was tried in this field, but was unsuccessful. Portions of this field have been under a natural water flood since 1904. The water is coming from improperly plugged wells.

REMARKS - The wells are now pumped with jacks and central power. The early wells did not flow and made only a small amount of gas. The initial productions of the early wells were up to 80 barrels a day. None of the wells are large producers, but are long lived. Some wells after having produced for 20 years, yield between 2 and 3 barrels a day. The oil production in this field is somewhat spotted. The daily production for this field is about 40 barrels a day of oil.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Richardson, G. B., 1936, U.S. Geol. Survey, Bull. 873; data from present operators in the field.

BUTLER COUNTY, PENNSYLVANIA

D NAME Oneida FIELD No. 87

ATION Center and Oakland Township

ler County Butler Quadrangle

COVERY DATE AND WELL 1885

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
dred Foot	1 375	2 750 000	700 000	70 000
Total	1 375	2 750 000	700 000	70 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
dred Foot	1200	105	10	6-1/4	650

DUCING WELLS Unknown ABANDONED WELLS Unknown

LL SPACING About 400 feet between wells.

ND CHARACTERISTICS - The Hundred Foot is a massive, fine- to medium coarse ained sandstone. Usually a softer pay zone occurs and sometimes a coarse pebbly r. Occasionally there are two pays in this sand. The pay is generally found out 5 feet below the bottom of the break. The break is sometimes 40 feet thick.

ERATIONS - Secondary recovery operations have not been tried.

MARKS - The wells are pumped with individual gas engine units and with jacks d a central power. Initial productions of the early wells were up to several ndred barrels. The average initial production was less than 50 barrels daily. e Hundred Foot in some areas contains large amounts of water. These wells are mped 24 hours a day. This area contains spotty Boulder and Third sand produc- on.

FERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National De- nse (Unpublished); Richardson, G.B., 1936, U.S. Geol. Survey, Bull. 873; unpub- shed data from the files of the Pa. Geol. Survey.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Parker (includes Sucker Rod field) **FIELD No.** 81
LOCATION Parker, Allegheny (Hovey and Perry) **Township or Borough**
Butler (Armstrong) **County** Foxburg and Hilliards **Quadrangle**
DISCOVERY DATE AND WELL 1869

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	280	1 000 000	200 000	20 000
Third	9 315	55 890 000	10 000 000	1 000 000
Total	9 595	56 890 000	10 200 000	1 020 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1280	60	12	5-5/8 in early wells,	250
Third	800 to 1400	30	20	6-1/4 recently	500

PRODUCING WELLS Unknown **ABANDONED WELLS** Unknown
WELL SPACING Average 1 well to every 4 acres
SAND CHARACTERISTICS - The Hundred Foot sand ranges from coarse-grained to pebbly. Two pays are present, one at the top and one at the bottom of the sand. The Third is a white sand and varies from a broken, shaley, coarse-grained sandstone to a loose, pebbly sandstone. Sometimes the Third contains 2 pays which are about 8 feet apart.

OPERATIONS - Most of the area is under vacuum which has slightly aided the production of oil. The Parker field has responded to gas drive.

REMARKS - About 75 percent of the field is inactive. Initial productions from the Third sand ranged from 35 to 1000 barrels per day. Wells producing from the Hundred Foot had initial productions as high as 2000 barrels per day, with an average of about 50 barrels. About 1 barrel of salt water is produced with each barrel of oil. There is some evidence of a natural water drive southwest of Parker City. The wells are pumped by jacks using a central power station. The remainder of this field is in Armstrong and Clarion Counties and is discussed under the Armstrong County section.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Shaw, E. W., and Munn, M.J., 1911 b, U.S. Geol. Survey, Bull. 454; data from present operators in the field.

BUTLER COUNTY, PENNSYLVANIA

ELD NAME Queen Junction (includes small surrounding areas) **FIELD No.** 85

CATION Brady, Franklin, Center and Clay **Township**

Butler **County** Butler **Quadrangle**

COVERY DATE AND WELL October 1936, Rockenstein #1, Initial production - 20 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	50	100 000	25 000	(very little)
Shira	30	30 000		(very little)
Total	80	130 000	25 000	

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1100	90	10	8-1/4, 6-1/4	50, 600
Shira	1350	8	5	6-1/4, 4-7/8	600, 1270

PRODUCING WELLS 2 **ABANDONED WELLS** 33

WELL SPACING About 400 feet between wells

SAND CHARACTERISTICS - The Hundred Foot sand is a fine- to medium-grained sandstone, with a coarser sometimes pebbly pay. Sometimes two pays occur. The top pay is most frequently encountered at about 12 feet in the sand. The second pay is found about 30 feet in the sand. The Shira sand is a fine- to medium-grained sandstone, the pay, which contains some pebbles, occurs about ? feet in the sand.

OPERATIONS - Secondary operations have not been tried in this field.

REMARKS - The wells are pumped with individual gas engine units. The Hundred Foot oil in this district is very heavy and black in color. The early wells had initial productions up to 10 barrels daily. All except one of the Hundred Foot wells are now abandoned. The Shira wells had initial productions up to 40 barrels daily. Only one well is now producing from this sand. Its production is very small. Water has flooded the Shira sand. The Hundred Foot sand has never been flooded. The total oil production in the Queen Junction field proper, from the date of discovery (October 1936) to January 1, 1947, was 13,685 barrels.

REFERENCE - Unpublished data from the files of the Pa. Geol. Survey.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Renfrew - McCalmont FIELD No. 95
LOCATION Butler, Forward, Penn and Conoquenessing Township
Butler County Butler Quadrangle
DISCOVERY DATE AND WELL 1882, Weber well

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	550	1 100 000	275 000	28 000
Thirty Foot	137	274 000	69 000	7 000
Boulder	140	224 000	56 000	6 000
Third	4 540	7 264 000	1 816 000	182 000
Total	5 367	8 862 000	2 216 000	223 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1400	105	10	6-1/4, 4-1/4	650, 1250 to 1450
Thirty Foot	1500	20	10		
Boulder	1600	20	8		
Third	1650	30	8		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 350 feet between wells
SAND CHARACTERISTICS - The Hundred Foot sand consists of "clover seed" sand on top, changing to a white sugar sand and then to a harder and finer barren sand. The pay occurs about 30 feet in the sand. The Thirty Foot sand is a white, pebbly, medium-grained sand. The Boulder sand consists of a chocolate, very soft, fine sand where productive and a much harder sand where unproductive. The Third sand consists generally of a very dark sand on top about 3 to 5 feet thick. Then a 5 foot bed of white, very coarse, pebbly sand which is the pay horizon. The next 10 feet is generally broken and the last 5 to 8 feet is a sugar pay sand, if present.

OPERATIONS - Vacuum has been in operation in this field for years and has been very successful. No other secondary recovery operation has been tried. Some of this area is reacting to an accidental water flood and the wells have increased considerably in the production of oil.

REMARKS - The wells are pumped with individual gas engine units. Very little water is produced from the Third sand. The initial productions of early wells were up to 2000 barrels daily in this sand. The Boulder sand wells had initial productions up to 15 barrels of oil daily and no water. The Thirty Foot sand wells had initial productions up to 75 barrels of oil a day and some wells had oil to water ratios of 1:2. The Hundred Foot sand had initial productions up to 100 barrels of oil daily and up to 1800 barrels of water daily. The average daily production of the wells in this field is about 1 barrel of oil

REFERENCE - Richardson, G.B., 1936, U.S. Geol. Survey, Bull. 873; data from present operators in the field.

BUTLER COUNTY, PENNSYLVANIA

LD NAME Rosenberry FIELD No. 79

CATION Allegheny Township

tler County Foxburg Quadrangle

COVERY DATE AND WELL 1895, J. Rosenberry well

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
ndred Foot	1 575	5 670 000	1 100 000	110 000
Total	1 575	5 670 000	1 100 000	110 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
ndred Foot	1280	60	12	6-1/4	500

ODUCING WELLS Unknown ABANDONED WELLS Unknown

LL SPACING 300 to 400 feet

ND CHARACTERISTICS - The top 10 feet of the Hundred Foot are a light gray, ght sand. Below this are 18 inches of a very loose, pebbly sand, with the mainder of the Hundred Foot being medium- to coarse-grained.

PERATIONS - Repressuring by using gas at low pressures, is in operation in e northern end of the field. This has increased production from 1/4 to 8 rrels per day in some wells. Vacuum has also been in operation for many ars.

MARKS - Early initial productions of the wells were as high as 2000 barrels r day with the average being about 50. There is also some spotted production om the Third sand. The wells are being pumped by jacks using central gas en- ine power.

FERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator or National Defense (Unpublished); data from present operators in the field.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Shira Streak **FIELD No.** 80
LOCATION Clay, Concord, Washington, Parker and Allegheny **Tow. ip**
Butler **County** Hilliards **Quadr le**
DISCOVERY DATE AND WELL 1893, Alexander Bell well

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Shira	1 360	3 850 000	640 000	60 000
Total	1 360	3 850 000	640 000	60 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Shira	1150 to 1425	10	9	6-1/4	500

PRODUCING WELLS Unknown **ABANDONED WELLS** Unknown
WELL SPACING About 400 feet between wells
SAND CHARACTERISTICS - The Shira sand is a greenish-gray, medium-grained to pebbly sandstone. The top one foot or less contains pebbles up to 1 inch or more in diameter and is gas bearing. The oil pay sand is medium-grained and averages 9 feet in thickness.

OPERATIONS - Air and gas drive projects have been successful in this field.

REMARKS - The wells are pumped with jacks and a central power. Early wells had initial productions up to 100 barrels daily. Many of the early wells are abandoned. Very little water is produced with the oil.

REFERENCE - Sherrill, R. E., and Matteson, L.S., 1939, Pa. Geol. Survey, 4th Ser., P.R. 122.

BUTLER COUNTY, PENNSYLVANIA

LD NAME Thorn Creek FIELD No. 96

CATION Penn Township
hler County Butler Quadrangle

SCOVERY DATE AND WELL 1884, Armstrong #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	150	450 000	113 000	17 000
Third and Fourth	860	5 160 000	1 290 000	15 000
Total	1 010	5 610 000	1 403 000	32 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1250	100	15	5-5/8,	600
Third and Fourth	1550	40	30	4-1/4	1200

PRODUCING WELLS 13 ABANDONED WELLS 165

WELL SPACING 350 feet between wells

SAND CHARACTERISTICS - The Third and Fourth sands appear to run together in this field and obtain a maximum thickness, of 65 feet. The sand ranges from a white, fine, hard sandstone, to a grayish-white, very coarse, pebbly sandstone, with flat well worn pebbles up to an inch in diameter. In the best part of the field, the entire sand is pay sand. In places a hard streak occurs in the middle of the sand body. The permeability is over 1500 millidarcies in the looser part of the sand. The Hundred Foot sand is a white to grayish sandstone with a "clover seed pay".

OPERATIONS - Vacuum was on the field for years and was very successful during the years of operation. Parts of the field are reported to have been flooded by water from poorly plugged wells. The flood is said to have started at both ends of the field and worked toward the center. Air or gas drive or water flooding does not look promising for this area.

REMARKS - The wells were pumped by individual gas engine units. Initial productions in the early days were up to 10,000 barrels of oil daily. Very little water is produced from the Third and Fourth sand. There are 6 Third and Fourth sand wells producing. The rest of the production is from the Hundred Foot sand. The average production from either sand is about one barrel of oil per day while the Hundred Foot sand produces about 50 barrels of water daily. Initial productions of Hundred Foot wells were as high as 30 barrels of oil daily.

REFERENCE - Richardson, G.B., 1936, U.S. Geol. Survey, Bull. 873; data from present operators in the field.

BUTLER COUNTY, PENNSYLVANIA

FIELD NAME Wadsworth - North Oakland FIELD No. 88
LOCATION Oakland, Donegal, Clearfield and Summit Tow
Butler County Butler Quadr
DISCOVERY DATE AND WELL 1874

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	385	616 000	154 000	15 000
Third and Fourth	7 095	7 095 000	1 773 000	177 000
Total	7 480	7 711 000	1 927 000	192 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1250	90	8	6-1/4,	600,
Third and Fourth	1600	20	5	4-7/8	1350

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 1 well per 4 acres
SAND CHARACTERISTICS - The Hundred Foot sand where productive is white to brown, coarse-grained to pebbly. The Third sand is variable in composition and ranges from fine- to coarse-grained. The Fourth is a white, coarse-grained sandstone with a pebbly "clover seed" pay. The Hundred Foot has two pays in some wells.

OPERATIONS - No secondary recovery operations have ever been tried in this field. Most of the Third and Fourth sand wells have been under vacuum for over 50 years. Vacuum has never been tried on the Hundred Foot.

REMARKS - A well, a half mile northeast of North Oakland, had an initial production from the Third sand, of about 1,000 barrels per day. The Hundred Foot sand wells had initial productions of smaller volume. Now the wells produce an average of about 3/4 barrel per day. Only the Hundred Foot contains any appreciable amount of salt water. The eastern side of this field is principally Third sand production while the Fourth and Hundred Foot production is mostly on the west.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

CLARION COUNTY, PENNSYLVANIA

FIELD NAME Clarion-Miola (includes Manor, Shamburg and Mill Creek fields) FIELD No. 104

LOCATION Highland, Clarion and Monroe
Township
Clarion County Clarion and Tionesta Quadrangle

DISCOVERY DATE AND WELL Clarion - 1888; Miola - 1906, Initial production - 80 barrels daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Third	2 150	6 450 000	1 290 000	129 000
Fourth	1 050	1 575 000	252 000	25 000
Total	3 200	8 025 000	1 542 000	154 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Third	900 to 1200	35	10	6-1/4	550
Fourth	950 to 1250	25	6		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING About 300 to 400 feet apart

SAND CHARACTERISTICS - The Third sand is pebbly at the top and grades to a white to brownish, coarse sandstone. The pay is located about 12 feet in the sand or about 25 feet in the sand. The Fourth sand is separated from the Third sand by 6 feet of very hard silty sandstone or shale. The Fourth sand consists of a dark-gray, fine sandstone and, where productive, the pay is in the bottom of the sand.

OPERATIONS - Vacuum has been on this field for years and increased the production a great deal. At present some areas have vacuum on the sand and are recycling the gas. This has increased production from three to five times. A small recycling operation is successful in the northern part of the field.

REMARKS - The Mill Creek field has principally gas in the Speechley sand with a small amount of oil production. The largest well in the early days was the Big Monkey which produced about 1400 barrels a day. The southern part of the field contains a great deal of salt water. The oil to water ratio in this part of the field is 1 to 10. In the center of the field about 300 acres has fresh water on the sand. The northern part of the field produces very little water and is active while the central and southern sections are almost completely inactive. Maximum daily production was in 1888 with a production of 3,000 barrels.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Shaw, E. W., Lines, E.F., and Munn, M.J., 1911, U.S. Geol. Survey, Geol. Atlast 178; data from present operators in the field.

FIELD NAME Cogley **FIELD No.** 102
LOCATION Ashland and Elk **Township**
Clarion **County** Oil City **Quadrangle**
DISCOVERY DATE AND WELL 1885, John Young well

RESERVE ESTIMATE AS OF JANUARY 1, 1943

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Knox Third	3 590	15 140 000	3 085 000	309 000
Knox Fourth and Fifth	685	1 370 000	220 000	22 000
Total	4 275	16 510 000	3 305 000	331 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Knox Third	950	15	12	5-5/8	450
Knox Fourth and Fifth	975 and 1000	15 and 10	5 and 5		

PRODUCING WELLS Unknown **ABANDONED WELLS** Unknown
WELL SPACING 1 well per acre to 1 well per 6 or 7 acres

SAND CHARACTERISTICS - The Knox Third sand is generally pebbly near the top. However, northwest of Fern, the pebble sand is reported to be in the middle of the sand. Here the sand above and below the pebble pay is fine and hard. The Knox Fourth and Fifth sands are said to be darker and finer than the Third sand. A core analysis in the Cogley field shows the Third sand has a porosity of 18 percent and the Fourth a porosity of about 12 percent.

OPERATIONS - Vacuum was applied to this field in 1898 and a large increase in production resulted, but this increase lasted only a few years. Gas drive has also been applied to a small area with very satisfactory results.

REMARKS - Present initial productions of new wells in the Knox Third sand are up to 5 barrels per day. Most of the wells produce several times as much salt water as oil. In the valley of Sandy Creek, a large area of the field has been abandoned because of fresh weater flooding out of the wells. Some Fourth sand production, however, is still being obtained in this area.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Dickey, Parke A., Sherrill, R.E., and Matteson, L.S., 1943, Pa. Geol. Survey, 4th Ser., Bull. M25; data from present operators in the field.

CLARION COUNTY, PENNSYLVANIA

LD NAME Knox (includes small fields and a small part of Emlenton-Richey Run field) FIELD No. 103

CATION Richland, Beaver, Salem, Elk and Ashland Township

larion County Tionesta, Foxburg, Clarion and Oil City Quadrangle

COVERY DATE AND WELL Area was drilled - 1865-1870; large pools drilled in 1869

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive gas drive or air (bbls.)	Recoverable by primary methods (bbls.)
Red Valley	200	200 000	32 000	3 000
Boulder	300	375 000	60 000	6 000
Third	14 260	51 400 000	10 280 000	1 028 000
Fourth	675	845 000	136 000	14 000
Total	15 435	52 820 000	10 508 000	1 051 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Red Valley	1000	20	4	6-1/4	650
Boulder	1100	20	5		
Third	980 to 1150	40	12		
Fourth	1000 to 1200	20	5		
Fifth	1100 to 1200	10	5		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING Varies from 1 well per acre to 1 well per 6 or 7 acres

SAND CHARACTERISTICS - The Red Valley is white with a loose pebbly pay. Where productive the Boulder is a loose pebbly sandstone. The Third sand is gray, fine- to coarse-grained and pebbly. The pebbles are usually near the top of the sand. The Fourth sand is a fine-grained, hard sandstone with occasional loose pebbly lenses containing oil.

OPERATIONS - Repressuring of the Third sand with gas has been tried in small areas. Production was increased for a while, but the sand is not uniform and the gas soon by-passed the oil.

REMARKS - The field is about 85 percent inactive. Initial productions of the early wells were as high as 1500 barrels per day. The Third sand contains some salt water in places. The Fourth has a small amount of saltwater and the Boulder is usually dry. The Third sand is watered out by fresh water and saltwater in local areas throughout the entire field. The wells are pumped by jacks using central power units. Most of the field is under vacuum.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

CRAWFORD COUNTY, PENNSYLVANIA

FIELD NAME Atlantic FIELD No. 49
LOCATION West Fallowfield and East Fallowfield Township
Crawford County Shenango and Linesville Quadrangle
DISCOVERY DATE AND WELL 1930, Andrews #1, Initial production - about 3 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Berea	500	400 000		
Total	500	400 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Berea	400	10	4	6-1/4	300

PRODUCING WELLS 7 standing ABANDONED WELLS Unknown
WELL SPACING About 800 feet between wells
SAND CHARACTERISTICS - The Berea sand is a gray, fine-grained, hard sandstone.

OPERATIONS - Secondary recovery operations were never tried. The sand in this field contains a great deal of connate water. Indications are that the sand has been flooded with fresh water. Secondary recovery does not look favorable in this field at present.

REMARKS - The wells were pumped for two years. Most of the wells produced a great deal of water and at present they are all standing with equipment in them. The wells were pumped by individual pumping units.

REFERENCE - Data from present operator in the field.

CRAWFORD COUNTY, PENNSYLVANIA

LD NAME Church Run FIELD No. 48

CATION Oil Creek, Rome and Sparta Township
awford County Titusville and Corry Quadrangle

COVERY DATE AND WELL November 1865, Eureka well, Initial production - 52 barrels
ily, with a maximum of 175.

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Third Stray	2 500	3 750 000	160 000	38 000
Third	5 200	50 000 000	8 000 000	800 000
Total	7 700	53 750 000	8 160 000	838 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Third Stray	400 to 650	12	6	6-1/4	250 to 500
Third	450 to 700	30	25		

PODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING About 2 to 4 acres per well

SAND CHARACTERISTICS - The Third sand is mostly pebbly throughout its entire thickness, some beds being loose unconsolidated conglomerate with pebbles up to one inch in length. In places, however, the beds of sandstone are without pebbles but contain a few beds of shale. In the pebbly part of the sand the permeability ranges from 2,000 to 5,000 millidarcies. To the east the pebbles disappear and the sand becomes thinner, consisting of white, medium- to fine-grained sandstone with beds of shale and sandy shale. The permeability decreases to between 10 and 5 millidarcies in this area. The Third Stray is a well cemented, pebbly, broken sandstone.

OPERATIONS - This field was under vacuum for a number of years. At present most of the field is being operated under air-gas drive. Secondary operations in this field have been very successful.

REMARKS - This field was abandoned for many years due to surface water entering the producing horizon from improperly cased wells and flooding the pebbly part of the field. Between 1920 and 1922 the field was dewatered and produced oil thereafter. The wells are pumped with jacks and a central power and some with individual electric units. About 600 acres of this field are inactive. Very little production is obtained from the Third Stray sand.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Dickey, Parke A., 1941, Pa. Geol. Survey, 4th Ser., Oil. M22.

CRAWFORD COUNTY, PENNSYLVANIA

FIELD NAME Dotyville FIELD No. 47
LOCATION Oil Creek (Southwest) Township
Crawford (Warren) County Titusville Quadrangle
DISCOVERY DATE AND WELL May 1872, Newton gas well

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Third	160	400 000	64 000	7 000
Total	160	400 000	64 000	7 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Third	600	50	10	6-1/4	250 to 500

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 2 to 4 acres per well
SAND CHARACTERISTICS - The Third sand is reported to be almost entirely pebbly and attains a thickness of 80 feet.

OPERATIONS - The field has been subjected to vacuum for the last few years and has produced considerable quantities of casinghead gasoline in addition to the oil. Secondary recovery operations have not been tried in this field.

REMARKS - There apparently was a large amount of connate water in the sand. One well pumped salt water for six years before it came onto oil. The wells are pumped with jacks and a central power. The entire field is discussed here.

REFERENCE - Dickey, Parke A., 1941, Pa. Geol. Survey, 4th Ser., Bull. M22.

ELK COUNTY, PENNSYLVANIA

FIELD NAME Glenhazel FIELD No. 20

LOCATION Jones Township
County Mt. Jewett Quadrangle

DISCOVERY DATE AND WELL 1894

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
Bradford Third				
(poorer)	1 700	9 690 000		25 000
(richer)	300	2 550 000	1 000 000	75 000
Total	2 000	12 240 000	1 000 000	100 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Bradford Third	1800 to 2100	22	19	6-1/4	300 to 600

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING 243 feet between wells in present project

SAND CHARACTERISTICS - The Bradford Third sand has an average porosity of 14.9 percent and an average permeability of 19.45 millidarcies. The sand is a grayish brown to chocolate-brown sandstone, composed predominatingly of fine to very fine angular quartz grains. Occasionally a few well-rounded quartz pebbles occur scattered through the sandstone. Wide variations in total thickness and number and thickness of shale partings occur in this sand.

OPERATIONS - Water flooding was started in this field in 1940 and has been successful.

REMARKS - Jacks with central power are used for pumping the wells. The initial production of early wells in this field was 3 to 4 barrels of oil per day. A great deal of this field is inactive. This field is about 6 times larger than the acreage shown, but only about 300 acres probably will be developed. About 118 acres of this have been developed to date.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Fettke, Charles R., 1948, Water Flooding in Pennsylvania, P.I., Sec. Recovery of Oil in the U.S., Rev. ed. (In press); unpublished data from the files of the Pa. Geol. Survey.

ELK COUNTY, PENNSYLVANIA

FIELD NAME Kane **FIELD No.** 19
LOCATION Highland (Wetmore and Howe) Town
Elk (McKean, Forest) **County** Kane Quadra
DISCOVERY DATE AND WELL 1881

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
Kane				
(poorer)	2 000	6 240 000		20 000
(richer)	2 000	7 440 000	1 240 000	124 000
Total	4 000	13 680 000	1 240 000	144 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Kane	2100 to 2500	30	12	6-1/4	450

PRODUCING WELLS Unknown **ABANDONED WELLS** Unknown
WELL SPACING About 5 to 10 acres per well

SAND CHARACTERISTICS - The Kane sand is a medium chocolate brown, fine- to very fine grained sandstone and is somewhat calcareous in places. The average porosity is about 12.5 percent. The permeabilities range from .5 to 17 millidarcies with an average of 4 millidarcies.

OPERATIONS - Unsuccessful water flooding was tried in this field when very little was known about this method of secondary recovery. Later other water flooding projects were tried with no success. A gas drive was tried with some success, but it was not economical to continue the project.

REMARKS - The wells are pumped with jacks and central powers. Some wells are pumped with individual units. The early wells had initial productions as high as 100 barrels daily. Recent wells have initial productions from 1 to 5 barrels daily. The saturations in this field are rather low and at present it does not look promising for secondary recovery in this field. Part of this field is in McKean and Forest Counties and is discussed in the McKean County section.

REFERENCE - Data from present operators in the field; unpublished data from the files of the Pa. Geol. Survey.

ELK COUNTY, PENNSYLVANIA

IED NAME St. Marys FIELD No. 21

OATION Benzinger Township

County Ridgway Quadrangle

OVERY DATE AND WELL 1900

RESERVE ESTIMATE AS OF JANUARY 1, 1947

roducing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Queen	160	400 000	64 000	6 000
Total	160	400 000	64 000	6 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Queen	1730	17	10	6-1/4	400

PRODUCING WELLS 18 ABANDONED WELLS 2

WELL SPACING About 670 feet between wells

SAND CHARACTERISTICS - The Queen sand consists of a light to dark brown, fine-grained sandstone.

OPERATIONS - Secondary recovery operations have never been tried in this field.

REMARKS - Initial productions of early wells ranged from 2 to 15 barrels per day. The peak production for the field occurred in 1906 with a total of 10,000 barrels for the year. The total production to 1946 is about 137,000 barrels. The wells are pumped by individual gas engine units.

REFERENCE - Data from present operators in the field; unpublished data from the files of the Pa. Geol. Survey.

FOREST COUNTY, PENNSYLVANIA

FIELD NAME Balltown - Truemans FIELD No. 39

LOCATION Kingsley, Howe (Cherry Grove) Town

Forest (Warren) County Sheffield Quadra

DISCOVERY DATE AND WELL 1877

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Balltown	3 400	16 000 000	3 200 000	320 000
Total	3 400	16 000 000	3 200 000	320 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Balltown	1200 to 1800	20	15	6-1/4	200 to 700

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING About 400 feet between wells

SAND CHARACTERISTICS - The Balltown sand ranges from a white to cream colored, fine sand to a coarse-grained sand with pebbles up to 1/2 inch in length. There is no caprock. The first 7 feet of sand are very soft and coarse and is easily crushed in your hands. The rest of the sand is harder.

OPERATIONS - A large part of this field has been under vacuum and this operation has been very successful. Gas drive projects in the field have been very successful. One project increased the production 5 times the amount that was being produced before the gas injection was started.

REMARKS - The wells in this field are pumped with jacks and central powers. Development of this field did not begin until 1882. Many of the early wells produced a lot of gas and had initial productions ranging from 100 to 3,000 barrels of oil per day. A small percentage of this field is inactive. Today some wells produce as high as 6 barrels of oil per day. The average production in one project for wells affected by repressuring is about 3 barrels of oil per day. The water production ranges as high as 3 of water to 1 of oil while the average water production is about 1/4 of a barrel per day. A very small portion of this field is in Warren County, but the entire field is discussed here.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

FOREST COUNTY, PENNSYLVANIA

FIELD NAME Cooper FIELD No. 33

LOCATION Howe (Sheffield, Cherry Grove, Wetmore and Hamilton) Township
West (Warren, McKean County Sheffield (Kane) Quadrangle

DISCOVERY DATE AND WELL October 1882

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air-gas or water drive (bbls.)	Recoverable by primary methods (bbls.)
Balltown	200	750 000	120 000	12 000
Cherry Grove	250	750 000	120 000	12 000
Cooper	2 550	11 500 000	2 300 000	230 000
Total	3 000	13 000 000	2 540 000	254 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Balltown	1150 to 1750	20	15	6-1/4	300 to 400
Cherry Grove	1200 to 1800	17	12		
Cooper	1400 to 2000	20	15		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING 1 to 5 acres per well

SAND CHARACTERISTICS - The Balltown sand ranges from a fine-grained to a very coarse sandstone. The Cherry Grove sand is a white, fine to coarse sandstone. The Cooper sand consists of a reddish, fine-grained sand to a white, coarse sand. The white sand is the most permeable and occurs associated with the red sand. The white sand may occur either at the top, middle or bottom of the sand body. The porosity averages between 12 to 15 percent. In some areas the permeability is under 50 millidarcies, but maximum permeabilities in the order of 3000 millidarcies may be expected.

OPERATIONS - All methods of secondary recovery have been applied to the Cooper sand and where intensively applied, have, in the majority of attemps, been successful. Recent water flooding experiments indicate that this method can be profitably used in many parts of the Cooper sand field. The other sands are spotty in production and it would not be economical to operate them under secondary recovery.

REMARKS - Jacks with central powers are used to pump the wells. Original initial productions were as high as 1000 barrels of oil per day. Some of this Cooper field lies in Warren and McKean Counties and will be reported in the county sections. The first well that was drilled in the area was the Blue Jay #1, in 1880, with an initial production of 5 barrels a day.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Carll, John F., 1883, Pa. 2nd Geol. Survey, Rpt. I 4; Unpublished data in the files of the Pa. Geol. Survey.

FOREST COUNTY, PENNSYLVANIA

FIELD NAME Lacy (Guitonville) FIELD No. 42
LOCATION Green Town
Forest County Tionesta Quadra
DISCOVERY DATE AND WELL 1908

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Second Venango	127	318 000	51 000	5 000
Total	127	318 000	51 000	5 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Second Venango	810	18	10	6-1/4	320

PRODUCING WELLS 14 ABANDONED WELLS 14
WELL SPACING About 500 feet between wells
SAND CHARACTERISTICS - The Second sand is a gray, fine-grained sandstone with a pebbly, porous pay streak.

OPERATIONS - Vacuum was tried in this field. A gas drive project has been in operation for many years. The introduction of gas increased the oil production.

REMARKS - Initial productions of early wells producing from the Second sand ranged from less than 1 barrel to 22 barrels per day of oil, while one well drilled to the Third sand had an initial production of 100 barrels per day. The early wells produced only a small amount of gas. The present wells pump practically no water and only a small amount of oil. The best well in the field today pumps about 1/2 barrel of oil per day.

REFERENCE - Data from present operators in the field; unpublished data from the files of the Pa. Geol. Survey.

FOREST COUNTY, PENNSYLVANIA

FIELD NAME Red Brush FIELD No. 43
LOCATION Tionesta Township
Forest County Tionesta Quadrangle
DISCOVERY DATE AND WELL 1902, Clapp #2, Initial production - 4 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Second	400	640 000	160 000	2 000
Total	400	640 000	160 000	2 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Second	900	12	8	6-1/4	350

PRODUCING WELLS 45 ABANDONED WELLS 6
WELL SPACING 900 feet
TREND CHARACTERISTICS - The Second sand is a gray, fine-grained, hard sandstone.

OPERATIONS - An air drive project was tried in this field, but it was unsuccessful. Vacuum was also tried and it was unsuccessful.

REMARKS - The wells are pumped with jacks and a central power. Only 12 wells are being pumped. The rest of the wells are standing. The highest initial production was 40 barrels per day. There is no water in this sand. The present total production is about 1/4 of a barrel per week from each well. This field was developed in 1911.

REFERENCE - Data from present operators in the field.

FOREST COUNTY, PENNSYLVANIA

FIELD NAME Salmon Creek FIELD No. 41
LOCATION Jenks Town
Forest County Sheffield Quadr
DISCOVERY DATE AND WELL 1907

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Clarion	200	480 000	96 000	10 000
Total	200	480 000	96 000	10 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Clarion	800	20	8	6-1/4	200 to 500

PRODUCING WELLS 20 ABANDONED WELLS 24
WELL SPACING About 350 feet between wells
SAND CHARACTERISTICS - The Clarion sand ranges from a white, fine-grained sandstone to a coarse-grained sandstone with grains 1/5 inch in length. The top few feet consist of a hard cap rock, then comes 8 feet of coarse pay sand and the rest of the sand is dark and broken.

OPERATIONS - Air was introduced into one well which affected a well on another lease and increased the oil production from that well a great deal. Nothing has been done since this experiment was tried.

REMARKS - Wells in this field are pumped with jacks and a central power. The early wells had initial productions as high as 50 barrels a day. These early wells produced a large amount of gas. Now the wells average about 1/8 of a barrel of oil per day. The water to oil ratio is about 2 to 1. Fresh water has not flooded the sands.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

FOREST COUNTY, PENNSYLVANIA

ED NAME Watson - Duhring FIELD No. 40

OATION Howe, Jenks (Sheffield) Township

st (Warren) County Sheffield, Marienville, Hallton and Kane Quadrangle

OVERY DATE AND WELL 1890

RESERVE ESTIMATE AS OF JANUARY 1, 1942

roducing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
herry Grove	4 200	11 350 000	2 270 000	227 000
ane	250	1 000 000	216 000	22 000
lk	150	700 000	180 000	18 000
Total	4 600	13 050 000	2 666 000	267 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
herry Grove	1500 to 1900	13	9	6-1/4	250 to 550
ane	2100 to 2500	25	12		
lk	2300 to 2700	17	10		

RODUCING WELLS Unknown ABANDONED WELLS Unknown

ELL SPACING From 2 to 7 acres per well

AND CHARACTERISTICS - The Cherry Grove sand ranges from a fine-grained to coarse sandstone. The Kane sand is medium chocolate brown, fine- to a very fine grained sandstone. The Elk sand is a chocolate brown, fine-grained, micaceous sandstone. The permeability of the Elk sand is about 10 millidarcies. The sand referred to here as Cherry Grove is locally called Watson.

OPERATIONS - A water flooding project in the Cherry Grove sand was not profitable but increased the oil production. A gas drive project in this same sand, was successful. No attempts have been made at secondary recovery in the Kane and Elk sands.

REMARKS - The wells are pumped with jacks and central powers using wire line. Also some wells are pumped with individual units. The initial productions of wells in the Cherry Grove sand were as high as 100 barrels per day. Elk and Kane sand wells have small initial productions, but they are long-lived. A very small portion of this field is in Warren County but the entire field is discussed here.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); unpublished data from the files of the Pa. Geol. Survey.

FOREST COUNTY, PENNSYLVANIA

FIELD NAME West Hickory FIELD No. 44
LOCATION Harmony, Tionesta, Green and Hickory Town
Forest County Tidioute Quadr
DISCOVERY DATE AND WELL 1870

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
First	450	2 700 000	432 000	43 000
White	450	2 000 000	400 000	40 000
Red Valley	350	1 900 000	420 000	42 000
Third Stray	3 300	15 200 000	2 400 000	600 000
Total	4 550	21 800 000	3 652 000	725 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
First	500 to 700	25	20	6-1/4	150 to 300
White	600 to 800	25	15		
Red Valley	600 to 800	20	15		
Third Stray	350 to 850	20	18		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 1 to 3 acres per well
SAND CHARACTERISTICS - The First sand occurs as local lenses or layers of white or gray, fine- to medium-grained sandstone, in an irregular group of thin-bedded shaly sandstones and sandy shales. The White sand is a medium-grained sandstone. The Red Valley sand is a gray, fine- to medium-grained sandstone. Small pebbles are generally scattered throughout its entire thickness. A thin pebble streak in the top of the sand is usually characteristic of it. The Third Stray sand ranges from fine-grained, to coarse to pebbly in texture and is very irregular.

OPERATIONS - Projects repressuring with air, gas or air-gas mixture have proven successful in this field in the First, Red Valley and Third Stray sands.

REMARKS - The wells are pumped with jacks and central powers. Present initial productions of new wells, range from 1 to 5 barrels daily. Small scattered pools producing from the First, White and Red Valley along with larger pools in the Third Stray sand, compose the production of this field.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Cathcart, S. H., Sherrill, R. E., and Matteson, L. S., 1938, Pa. Geol. Survey, 4th Ser., P. R. 118.

GREENE COUNTY, PENNSYLVANIA

FIELD NAME Aleppo FIELD No. 154

LOCATION Aleppo, Rich Hill and Spring Hill Township

Rogersville County Quadrangle

DISCOVERY DATE AND WELL 1900

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Gordon Stray	521	625 000	156 000	16 000
Gordon	348	418 000	102 000	10 000
Total	869	1 043 000	258 000	26 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Gordon Stray	3000	20	6	13, 10, 8-1/4	200, 1500,
Gordon	3050	15	6	6-5/8, 5-3/16	1650, 2100, 3010

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING 600 to 1000 feet

SAND CHARACTERISTICS - The Gordon is a fine-grained, hard and tight sandstone. Usually only one pay is present. It is fairly coarse and pebbly. No sand description is available for the Gordon Stray sand.

OPERATIONS - There has been no secondary recovery in this field, except for 1 or 2 experimental tests which were unsuccessful. A pressure of 1,000 p.s.i. was applied in one area but no satisfactory results were obtained. The sand seems to be too tight and the field is too sparsely drilled for any successful secondary operations.

REMARKS - The field is about 90 percent inactive. Average initial production was about 50 barrels per day. Initial productions for the Gordon Stray ranged from 50 to 2000 barrels per day. Both sands contain a little salt water. There is no known fresh water flooding. The wells are pumped by individual gas engines.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

GREENE COUNTY, PENNSYLVANIA

FIELD NAME Blackshire FIELD No. 164
LOCATION Monongahela Town
Greene County Masontown Quadra
DISCOVERY DATE AND WELL 1865, Blackshire well

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Big Injun	312	1 248 000		
Total	312	1 248 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Big Injun	1300	275	12 and 8	10, 8-1/4, 6-5/8	400, 1250, 1700

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 700 feet between wells
SAND CHARACTERISTICS - The pay zones are coarse, pebbly and very erratic. The first pay occurs 90 feet in the sand and the second is about 15 feet below the first.

OPERATIONS - Secondary recovery operations have never been tried.

REMARKS - The field consisted of only a few wells that did not hold up very long. Initial productions in the early days ranged from 80 to 100 barrels per day. The field is completely abandoned.

REFERENCE - Stone, R. W., 1932, Pa. Geol. Survey, 4th Ser., Bull. C30; data from former operators in the field.

GREENE COUNTY, PENNSYLVANIA

FIELD NAME Board Tree **FIELD No.** 156

LOCATION Spring Hill and Aleppo Littleton, Rogersville and Cameron
Township Quadrangle

Greene County

DISCOVERY DATE AND WELL 1898

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Upper Nineveh	165	198 000	50 000	5 000
Lower Nineveh	501	601 000	150 000	15 000
Gordon	444	655 000	156 000	16 000
Total	1 110	1 454 000	356 000	36 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Upper Nineveh	3200	20	6	13, 10, 8-1/4	200, 1500, 1650,
Lower Nineveh	3250	25	6	6-5/8, 5-3/16	2100, 3010
Gordon	3400	26	4		

PRODUCING WELLS Unknown **ABANDONED WELLS** Unknown

WELL SPACING About 400 feet between wells

SAND CHARACTERISTICS - The Nineveh sands are gray with a coarse pebbly pay. The Upper Nineveh sometimes contains 2 pays which are separated by a hard sand break. The Gordon sand is gray and very tight with a coarse and pebbly pay. A core analysis for the Gordon in an in-put well, shows an average porosity of 14 percent and permeabilities from 47.5 to 1879 millidarcies.

OPERATIONS - Repressuring of the Gordon has been tried in the area, but a thief sand made it unsuccessful for the present. This gas drive was started in may 1946. Very good recovery is expected in future attempts.

REMARKS - The field is about 40 percent inactive. Initial productions for the Nineveh sands ranged from 100 to 250 barrels per day. The Gordon had initial productions ranging from 10 to 700 barrels per day. Both fresh and salt water is produced with the oil. The wells are being pumped by individual gas engines.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

GREENE COUNTY, PENNSYLVANIA

FIELD NAME Bristoria FIELD No. 153

LOCATION Jackson, Aleppo, Center and Rich Hill Town

Greene County Rogersville Quadra

DISCOVERY DATE AND WELL 1896

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Upper Nineveh	2074	2 074 000	519 000	52 000
Lower Nineveh	576	691 000	173 000	17 000
Total	2650	2 765 000	692 000	69 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Upper Nineveh	3150	25	5	13, 10, 8-1/4,	200, 1500, 1
Lower Nineveh	3200	30	6	6-5/8, 5-3/16	2100, 3

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING 600 to 1000 feet

SAND CHARACTERISTICS - The Nineveh (Thirty Foot) sands are gray with a coarse and pebbly pay. Some wells have 2 pays which are separated by a hard layer. The first pay is 5 feet from the top of the sand and the second pay is 12 feet from the top.

OPERATIONS - It has been reported that 2 wells near Bristoria were flooded from unplugged wells and began to spray oil and gas in 1913. One well flowed as much as 75 barrels per day. Spraying and flowing continued intermittently for about 2 years, when the wells suddenly went to water. Artificial repressuring using gas, was tried about 15 years ago on the Gordon Stray sand near Bristoria. It took a pressure at 700 p.s.i. to start the oil moving, then 400 p.s.i. to maintain movement. For a short time production was increased by about 30 percent in the 2 nearest wells. This was not enough increase to maintain the operation.

REMARKS - Initial productions varied from 100 to 250 barrels per day. About 50 percent of the field is inactive. About 7 out of 10 wells pump both salt water and fresh. The wells are pumped individually by gas engines.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

GREENE COUNTY, PENNSYLVANIA

ID NAME Dunkard Creek FIELD No. 161

OATION Dunkard Township

ne County Masontown and Morgantown Quadrangle

OVERY DATE AND WELL 1864, Cephas Wiley

RESERVE ESTIMATE AS OF JANUARY 1, 1947

roducing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
i Dunkard	268	375 000	94 000	9 000
Total	268	375 000	94 000	9 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
i Dunkard	900	30	7	6 5	500 900

RODUCING WELLS Unknown ABANDONED WELLS Unknown

L SPACING 150 to 200 feet

D CHARACTERISTICS - The Big Dunkard sand is gray, hard and tight. Sometimes re are two light-gray, coarse, pebbly pays which are separated by a hard sand rak.

ERATIONS - Secondary recovery has not been tried.

MARKS - About 25 percent of the field is inactive. Initial productions of wells were from 30 to 70 barrels per day. Now the average is about 4 barrels day. Very little connate water is encountered. The oil is about 65 percent oline.

FERENCE - Stone, R.W., 1932, Pa. Geol. Survey, 4th Ser., Bull. C30; data from sent operators in the field.

GREENE COUNTY, PENNSYLVANIA

FIELD NAME Fonner (includes Wright field) FIELD No. 149
LOCATION Morris and Washington Town
Greene County Rogersville, Claysville, Amity and Waynesburg Quadra
DISCOVERY DATE AND WELL 1897, Fonner #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Gantz	801	1 121 000	280 000	28 000
Total	801	1 121 000	280 000	28 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Gantz	1450	30	7	10, 8	150, 1200

PRODUCING WELLS 14 ABANDONED WELLS 85
WELL SPACING 500 to 800 feet
SAND CHARACTERISTICS - The Gantz ranges from soft to hard with a coarse pebbly pay. Several pays have produced oil. They are separated by a hard sand layer.

OPERATIONS - Some secondary recovery was tried by using gas on the Gantz sand near Dunn's Station. This operation was unsuccessful. The sand is probably too tight.

REMARKS - Most of the field is inactive. Initial production for the best well was 110 barrels per hour. Now the best well in the field produces about 45 barrels per week. This well (Fonner) has been producing at least 45 barrels of oil per week for over 25 years. Other wells close to this well have been abandoned. This steady production indicates a natural water flood, probably the water enters the sand from the old abandoned wells. Also a Barnesdale and Ross well (east of Fonner well) has held up for sometime. Very little salt water is produced with the oil. Pumping is done by individual gas engines.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Stone, R. W., 1932, Pa. Geol. Survey, 4th Ser., Bull. C30; data from present operators in the field.

GREENE COUNTY, PENNSYLVANIA

FIELD NAME Garrison FIELD No. 158

LOCATION Spring Hill Township

Greene County Rogersville Quadrangle

DISCOVERY DATE AND WELL 1876

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Uper Nineveh	141	169 000	42 000	4 000
Total	141	169 000	42 000	4 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Uper Nineveh	3200	40	6	13, 10, 8-1/4, 6-5/8, 5-3/16	200, 1500 1650, 2100, 3010

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING 600 to 1000 feet

SAND CHARACTERISTICS - The Nineveh (Thirty Foot) sand is gray with a coarse pebbly gray. Some wells have 2 pays which are separated by a hard sand break. The first pay is about 5 feet below the top of the sand and the second is about 12 feet below.

OPERATIONS - Secondary recovery operations haven't been tried in this field.

REMARKS - Initial production of a well in 1928 was about 200 barrels per day. In 1936 initial productions averaged around 5 barrels per day. Some wells make little salt water. The wells are pumped by individual gas engines.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

GREENE COUNTY, PENNSYLVANIA

FIELD NAME Grays Fork FIELD No. 151
LOCATION Center Towns
Greene County Rogersville Quadran
DISCOVERY DATE AND WELL 1897

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Upper Nineveh	249	498 000	125 000	13 000
Total	249	498 000	125 000	13 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Upper Nineveh	2950	30	10	13, 10, 8-1/4, 6-5/8, 5-3/16	130, 1400, 20[illegible] 2200, 31[illegible]

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 600 to 1000 feet
SAND CHARACTERISTICS - The Nineveh (Thirty Foot) sand is gray with a coarse pebbly pay. Some wells have 2 pays separated by a hard sand break. The first pay is about 5 feet below the top of the sand and the second is about 12 feet below the top.

OPERATIONS - A gas drive project was tried by using pressures up to 600 p.s.i., but the sand did not take the gas. The wells respond very little to cleaning out.

REMARKS - About 40 percent of the field is inactive. A small amount of salt water is encountered but it is not troublesome. There is no known fresh water flooding out of the wells. The wells are pumped by individual gas engines.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

GREENE COUNTY, PENNSYLVANIA

FIELD NAME Lantz FIELD No. 159

LOCATION Wayne Township

Greene County Mannington Quadrangle

DISCOVERY DATE AND WELL 1899, Wm. Lantz #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Fourth	121	73 000	18 000	2 000
Fifth	412	494 000	124 000	12 000
Total	533	567 000	142 000	14 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Fourth	2900	25	3	6-5/8, 5-3/16,	1725, 2150,
Fifth	2975	20	6	4 inch liner	300

PRODUCING WELLS 2 ABANDONED WELLS 50

WELL SPACING 800 feet

SAND CHARACTERISTICS - The Fourth sand is gray, fine- to coarse-grained, and conglomeratic in places. The first oil pay is about 7 feet below the top of the sand and is loose, coarse, conglomeratic with some of the quartz pebbles being as large as 3/8 inch in diameter. Occasionally a second pay is present about 14 feet below the first. This pay is similar to the top pay but much smaller in production. The two are separated by a hard sand layer. The Fifth sand is similar to the Fourth in appearance, with the pay being about 10 feet from the top.

OPERATIONS - Secondary recovery operations have not been tried in this field.

REMARKS - At first the average initial production was about 150 barrels per day. One well made as much as 3300 barrels the first day. No salt water is found in the sands below the Big Injun sand. There is also some production from the Big Injun. One well was flooded by freshwater but so far it has not shown up in any other wells. Production is very spotted from the Fifth sand. The two producing wells now make about 5 barrels per week per well. All pumping is done by individual gas engines.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Stone, R. W., 1932, Pa. Geol. Survey, 4th Ser., Bull. C30; data from present operators in the field.

GREENE COUNTY, PENNSYLVANIA

FIELD NAME Mount Morris FIELD No. 160
LOCATION Perry and Dunkard Townsl
Greene County Waynesburg and Blacksville Quadrang
DISCOVERY DATE AND WELL 1886, O. E. Lemley #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Big Injun	1 095	4 380 000	1 095 000	110 000
Total	1 095	4 380 000	1 095 000	110 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Big Injun	1700	180	12 and 8	10, 8-1/4, 6-5/8	400 1250 1700

PRODUCING WELLS 25 ABANDONED WELLS Unknown
WELL SPACING 200 to 600 feet
SAND CHARACTERISTICS - The pay zones are coarse, pebbly, spotted and erratic. The first pay occurs 90 feet in the sand and the second is about 15 feet below the first.

OPERATIONS - Secondary recovery has not been tried in this field.

REMARKS - About 50 percent of the field is inactive. Directly around the town of Mt. Morris, only about 5 percent of the wells are being pumped. Initial productions ranged from 25 to 800 barrels per day. Salt water is found in the Big Injun. The wells are pumped by individual gas engines.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Stone, R. W., 1932, Pa. Geol. Survey, 4th Ser., Bull. C30; data from present operators in the field.

GREENE COUNTY, PENNSYLVANIA

FIELD NAME New Freeport FIELD No. 157
LOCATION Aleppo and Spring Hill Township
Greene County Rogersville Quadrangle
DISCOVERY DATE AND WELL 1896

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Upper Nineveh	2 495	2 994 000	749 000	75 000
Gordon	55	66 000	17 000	2 000
Fourth	54	32 000	8 000	1 000
Total	2 604	3 092 000	774 000	78 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Upper Nineveh	3200	20	6	13, 10, 8-1/4,	200, 1500,
Gordon	3400	45	6	6-5/8, 5-3/16	1650, 2100,
Fourth	3450	30	3		3010

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 600 to 1000 feet

SAND CHARACTERISTICS - The Nineveh (Thirty Foot) sand is gray with a coarse and pebbly pay. Some wells have 2 pays which are separated by a hard layer of sand. The pays are close together. The first pay is about 5 feet from the top of the sand and the second is about 12 feet from the top. The Gordon sand is gray and very tight with a coarse and pebbly pay. The Fourth sand has a coarse and pebbly gray zone.

OPERATIONS - Secondary recovery has not been tried in this field. The sand is probably too tight and the field is too sparsely drilled for successful secondary operations.

REMARKS - About 50 percent of the field is inactive. Initial productions for the Upper Nineveh ranged from 100 to 250 barrels per day. Some salt water is produced. Pumping is done by individual gas engines.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

GREENE COUNTY, PENNSYLVANIA

FIELD NAME Nineveh FIELD No. 150
LOCATION Morris Township
Greene County Rogersville Quadrangle
DISCOVERY DATE AND WELL 1888, John H. Smith #3

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Upper Nineveh	326	522 000	130 000	13 000
Lower Nineveh	316	379 000	95 000	10 000
Total	642	901 000	225 000	23 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Upper Nineveh	2900	45	8	10, 8-1/4	800, 1550
Lower Nineveh	2950	45	6	6-5/8	2000

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 600 to 1000 feet
SAND CHARACTERISTICS - The Nineveh sands are gray with a coarse pebbly pay. Some wells have 2 pays in the Upper Nineveh. These are separated by a hard sand layer. The first pay is about 5 feet from the top of the sand and the second about 12 feet from the top.

OPERATIONS - Secondary recovery operations have not been attempted in this field.

REMARKS - The field is about 80 percent inactive. The average initial production was about 40 barrels per day. The initial production of the discovery well was 310 barrels per day. A small amount of salt water is found, but it is not troublesome. No known fresh water flooding out of the wells is present.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Stone, R. W., 1932, Pa. Geol. Survey, 4th Ser., Bull. C30; data from present operators in the field.

GREENE COUNTY, PENNSYLVANIA

ELD NAME Rutan FIELD No. 155

CATION Morris Township

eene County Rogersville Quadrangle

SCOVERY DATE AND WELL 1926, T. F. Rutan well

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
per Nineveh	261	522 000	131 000	13 000
wer Nineveh	239	287 000	72 000	7 000
Total	500	809 000	203 000	20 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
per Nineveh	2900	50	10	10, 8-1/4	800, 1550,
wer Nineveh	2950	50	6	6-5/8	2000

ODUCING WELLS Unknown ABANDONED WELLS Unknown

ELL SPACING 600 to 1000 feet

ND CHARACTERISTICS - The Nineveh sands are gray with a coarse pebbly pay. Some lls have 2 pays which are separated by a hard sand break. The first pay is about feet below the top of the sand and second is about 12 feet below the top.

PERATIONS - Secondary recovery has not been tried in this field.

EMARKS - The field is about 80 percent inactive. Initial productions were as igh as 800 barrels per day with the average being about 40 barrels. A small amount f salt water is found in the sands, but it is not troublesome. There is no known resh water flooding out of the wells. The wells are pumped by individual gas ngines.

EFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National De- ense (Unpublished); Stone, R. W., 1932, Pa. Geol. Survey, 4th Ser., Bull. C30; ata from present operators in the field.

GREENE COUNTY, PENNSYLVANIA

FIELD NAME Tanner FIELD No. 162
LOCATION Dunkard and Greene Townsh
Greene County Masontown Quadrang
DISCOVERY DATE AND WELL 1876, Tanner well on Garrison farm

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Big Dunkard	418	585 000	146 000	15 000
Total	418	585 000	146 000	15 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Big Dunkard	900	30	7	6, 5	500, 900

PRODUCING WELLS 41 ABANDONED WELLS Unknown
WELL SPACING 500 feet average
SAND CHARACTERISTICS - The Dunkard sand is gray, hard and tight, with a light gray, coarse and pebbly pay. Two pays are sometimes found in the Big Dunkard and are separated by a hard sand break.

OPERATIONS - Secondary recovery operations haven't been tried in this field.

REMARKS - The field is about 90 percent inactive. Initial productions were from 30 to 70 barrels per day. Now the average is about 4 barrels per day. Very little salt water is found. The oil is about 65 percent gasoline. Wells are pumped by jacks (compressed air driven). There is no known fresh water flooding out of wells.

REFERENCE - Stone, R. W., 1932, Pa. Geol. Survey, 4th Ser., Bull. C30; data from present operators in the field.

GREENE COUNTY, PENNSYLVANIA

ELD NAME Whitely Creek FIELD No. 163

CATION Greene Township
eene County Masontown Quadrangle

SCOVERY DATE AND WELL About 1865, at Vance's Mill

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
g Dunkard	462	647 000	162 000	16 000
g Injun	20	80 000	20 000	2 000
Total	482	727 000	182 000	18 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
g Dunkard	900	30	7	6, 5	500, 900
g Injun	1700	180	12 and 8		

RODUCING WELLS 27 ABANDONED WELLS Unknown

ELL SPACING About 400 feet average

AND CHARACTERISTICS - The Big Dunkard sand is gray, hard and tight with a light ay, coarse and pebbly pay. Two pays are sometimes found and are separated by a rd sand break. In the Big Injun one pay is 90 feet below the top of the sand and e other is 15 feet below the first.

PERATIONS - Secondary recovery has not been tried in this field.

EMARKS - About 90 percent of the field is inactive. Salt water is found all he way through the Big Injun and a little in the Big Dunkard. The wells are pumped y pumping jack (compressed air driven). Over 20 years ago, 3 wells on the Maple arm, east of Willow Tree, were flooded out with fresh water.

EFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National De- ense (Unpublished); Stone, R. W., 1932, Pa. Geol. Survey, 4th Ser., Bull. C30; lata from present operators in the field.

GREENE COUNTY, PENNSYLVANIA

FIELD NAME Wright Run FIELD No. 152
LOCATION Rich Hill Townsl
Greene County Rogersville Quadran
DISCOVERY DATE AND WELL About 1900, McCracken #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Gordon Stray	587	704 000	176 000	18 000
Total	587	704 000	176 000	18 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Gordon Stray	3000	25	6	13, 10, 8-1/4 6-5/8	200, 1300 1850, 2100

PRODUCING WELLS 12 ABANDONED WELLS About 10
WELL SPACING About 600 feet between wells
SAND CHARACTERISTICS - The Gordon Stray sand is gray, fine- to coarse-grained and conglomeratic in places. The pay is about 4 feet below the top of the sand and is coarse and conglomeratic with white quartz pebbles ranging in size from 1/8 to 3/4 inch in diameter. Occasionally a very small pay is present in the top of the sand.

OPERATIONS - Secondary recovery has not been tried in this field.

REMARKS - The wells are pumped with individual gas engine units. Initial Productions for the Gordon Stray sand ranged from 50 to 75 barrels per day. The sand contains a small amount of connate water in a few wells. The average dail production now is less than 1 barrel per day. No wells are known to be flooded with fresh water.

REFERENCE - Stone, R. W., 1932, Pa. Geol. Survey, 4th Ser., Bull. C30; data from present operators in the field.

JEFFERSON COUNTY, PENNSYLVANIA

FIELD NAME Clear Creek (includes the Cather field) FIELD No. 46

LOCATION Heath, Barnett and Eldred Township

Jefferson County Marienville Quadrangle

DISCOVERY DATE AND WELL 1905, Henry, Long and Shields #1, Initial Production - barrels daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Speechley	1 310	2 620 000	420 000	42 000
Total	1 310	2 620 000	420 000	42 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Speechley	1840	10	8	6-1/4	570

PRODUCING WELLS 49 ABANDONED WELLS 24

WELL SPACING About 650 feet between wells

LAND CHARACTERISTICS - The Speechley sand consists of a brown to a predominantly gray, medium- to coarse-grained sandstone. Many shale partings occur in this sand. One core has been taken in this field, but the core information is not available.

OPERATIONS - Secondary operations have never been tried in this field. If fresh water is allowed to enter the producing sand it kills the well.

REMARKS - The wells are pumped with jacks and a central power. Most of the early wells flowed. The initial productions of the early wells were as high as 0 barrels of oil per day. The early wells produced a great deal of gas which had an initial rock pressure of 800 p.s.i. The rock pressure now is very low and the average oil production per well per day is about 1/5 of a barrel. The oil to water ratio is about 6 to 1.

REFERENCE - Data from present operators in the field; unpublished data from the files of the Pa. Geol. Survey.

JEFFERSON COUNTY, PENNSYLVANIA

FIELD NAME Lathrop FIELD No. 45
LOCATION Heath Township
Jefferson County Hallton Quadrang
DISCOVERY DATE AND WELL 1911, Lathrop #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Speechley	224	560 000	90 000	9 000
Total	224	560 000	90 000	9 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Speechley	1864	15	10	6-1/4	600

PRODUCING WELLS 26 ABANDONED WELLS 1
WELL SPACING About 600 feet between wells
SAND CHARACTERISTICS - The Speechley sand consists of a white, fine, hard, to a gray coarse sandstone. The first 2 feet, at the top of the sand, is hard. The gas pay occurs directly under this and the oil pay occurs below the gas pay.

OPERATIONS - Secondary recovery operations have never been tried in this field.

REMARKS - The average initial production of oil in the early days was 10 barrels per day. Initial productions ranged from 3 to 40 barrels of oil per day. The wells now produce about 1/8 of a barrel per day. Some salt water is pumped. The water to oil ratio is about 1 to 2. Some of the early wells flowed and had an average gas production of about 100,000 cu. ft. per day. The field has not been flooded with fresh water. The wells are pumped with jacks and a central power.

REFERENCE - Data from present operators in the field; unpublished data from the files of the Pa. Geol. Survey.

LAWRENCE COUNTY, PENNSYLVANIA

ELD NAME Bessemer FIELD No. 74

CATION North Beaver and Mahoning Township
wrence County Columbiana, New Castle and Neshannock Quadrangle

SCOVERY DATE AND WELL 1906, J. A. Webber well

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
rea	8 000	16 000 000	1 000 000	100 000
Total	8 000	16 000 000	1 000 000	100 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
rea	700	35	10	5-5/8	400

ODUCING WELLS 54 ABANDONED WELLS 1500 to 2000
ELL SPACING About 400 feet between wells
ND CHARACTERISTICS - The Berea is a light gray to white, fine-grained sandstone. ar the bottom are sometimes thin beds of shale. The top 20 feet is a good sand. e top of the pay is about 5 feet in the sand. The average porosity is about 19 rcent with a permeability below 30 millidarcies.

PERATIONS - One attempt was made with water flooding but was not successful. ir drive projects have had some success. The production for one well increased om 1/10 to 1/3 of a barrel. Vacuum was tried and increased the production ry little. None of the secondary recovery projects were profitable.

EMARKS - When the first wells were drilled in, the water to oil ratio was about to 1. The initial productions of oil originally were from 1 to 5 barrels per ay. The wells have been small producers but 95 percent of the wells drilled pro- uced oil and are long lived. Wells are pumped with jacks and a central power. n some places the casing only lasts 5 years while in other areas it lasts a great eal longer. Average present production is 1/10 of a barrel per day. The original ell pumped for at least 20 years.

EFERENCE - DeWolf, Frank W., 1929, Pa. Geol. Survey, 4th Ser., Bull. M22; Dickey, arke A., 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); ata from former and present operators in the field.

LAWRENCE COUNTY, PENNSYLVANIA

FIELD NAME Slippery Rock FIELD No. 75
LOCATION Wayne and Perry Townsh
Lawrence County Zelienople Quadrang
DISCOVERY DATE AND WELL 1864, Lawrence, Initial production - 50 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Shenango Sandstone Horizon	350	700 000		
Total	350	700 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Shenango Sandstone Horizon	200	30	10	Unknown	Unknown

PRODUCING WELLS None ABANDONED WELLS 70
WELL SPACING 300 to 500 feet between wells
SAND CHARACTERISTICS - The Shenango Sandstone Horizon is a coarse-grained sandstone.

OPERATIONS - Many dry holes were drilled and some wells were abandoned due to small production. The wells were not properly plugged when abandoned and the sand flooded with fresh water. Secondary recovery projects have not been tried.

REMARKS - The oil pay was encountered in the middle of the sand body. In general the initial productions were less than 10 barrels per day. The oil was a low gravity oil between 32° and 36°. This field is completely inactive.

REFERENCE - White, I. C., 1879, Pa. 2nd Geol. Survey, Rpt. QQ.

McKEAN COUNTY, PENNSYLVANIA

ELD NAME Bradford (in Pennsylvania) **FIELD No.** 5

OCATION Foster, Otto, Eldred, Lafayette, Bradford and Keating Township
Kean County Bradford and Smethport Quadrangle

SCOVERY DATE AND WELL November, 1871, Hinchey, Initial production - 10 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
adford Third	72 450	692 064 000	100 000 000	10 000 000
Total	72 450	692 064 000	100 000 000	10 000 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
adford Third	1000 to 1800	50	30	6-1/4	200 to 500

RODUCING WELLS Unknown **ABANDONED WELLS** Unknown
ELL SPACING About 200 feet between wells
AND CHARACTERISTICS - The Bradford Third sand is a grayish-brown to chocolate-rown sandstone composed predominatingly of fine to very fine angular quartz grains. casionally a few well-rounded pebbles of transparent to milkey quartz, up to 3mm. diameter, occur scattered through the sandstone. These are mostly in the upper yers and rarely constitute any appreciable volume of the rock. Wide variations total thickness and number and thickness of shale partings, occur in many places etween adjacent properties and even adjacent wells.

PERATIONS - Intensive water flooding has been successfully operated in this field ince 1928. Of the total reserve, 28 percent occurs in areas already developed, 3 percent in undeveloped areas that will yield 2,500 or more barrels per acre, and percent in areas that will yield about 1,500 barrels per acre. Intentional water looding probably was practiced on a small scale in the early nineties. It wasn't ntil 1907 that the effects of flooding became noticeable in the annual production f the field.

EMARKS - By the end of 1946, the total natural production of the field would have nounted to 184,746,000 barrels, if water flooding had not been inaugurated. The ctual total production of the field at the end of 1946, was 382,906,000 barrels. otal oil originally in Bradford field 1,074,970,000 barrels. Considerable areas f the Bradford field are flooded out. The production during June 1947 was about 20,000 barrels. This paper deals only with the area in Pennsylvania.

EFERENCE - Fettke, Charles R., 1938, Pa. Geol. Survey, 4th Ser., Bull. M21; Fettke, harles R., 1948, Water Flooding in Pennsylvania, A.P.I., Sec. Recovery of Oil in the .S., Rev. ed. (In press).

McKEAN COUNTY, PENNSYLVANIA

FIELD NAME Burning Well (Kanesholm) FIELD No. 18
LOCATION Hamlin, Wetmore and Sergeant Township
McKean County Mt. Jewett Quadrangle
DISCOVERY DATE AND WELL About 1875

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
Bradford Third				
Acres will water flood	3 200	43 650 000	6 000 000	600 000
Poorer part	900	10 800 000		100 000
Total	4 100	54 450 000	6 000 000	700 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Bradford Third	1000 to 1800	50	40	6-1/4	300 to 500

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 200 to 300 feet between wells
SAND CHARACTERISTICS - The Bradford Third sand has an average porosity of 14 percent by volume. It is a grayish-brown to chocolate-brown sandstone, composed predominately of fine to very fine angular quartz grains. Occasionally a few well-rounded pebbles of transparent to milky quartz occur scattered through the sandstone.

OPERATIONS - Intensive water flooding was commenced in 1930. In 1946 the annual production was 1,193,000 barrels. Water flooding in this field has been very successful.

REMARKS - About 1,400 acres of this field have yet to be developed and should yield about 2,500 barrels per acre from water flooding. Most of the economical and recoverable oil is recovered after 5-1/2 years of intensive water flooding. These wells are pumped with jacks and central powers and some individual electric units.

REFERENCE - Fettke, Charles R., 1948, Water Flooding in Pennsylvania, A.P.I., Sec. Recovery of Oil in the U.S., Rev. ed. (In press).

McKEAN COUNTY, PENNSYLVANIA

FIELD NAME Cooper (includes the Bliss field) FIELD No. 33
LOCATION Wetmore, Hamilton (Sheffield, Cherry Grove and Howe) Township
McKean(Warren,Forest) County Kane (Sheffield) Quadrangle
DISCOVERY DATE AND WELL 1882, Blue Jay #1, Initial production - 5 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air-gas or water flooding (bbls.)	Recoverable by primary methods (bbls.)
Cooper	2 300	16 100 000	4 000 000	400 000
Total	2 300	16 100 000	4 000 000	400 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Cooper	1300 to 2000	20	15	6-1/4	300 to 400

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 1 to 5 acres per well
SAND CHARACTERISTICS - The Cooper sand consists of a reddish, fine-grained sand to a white, coarse sand. The white is the most permeable and occurs associated with the red sand. The white sand may occur either at the top, middle or bottom of the sand body. The porosity averages between 12 to 15 percent. In some areas the permeability is under 50 millidarcies, but maximum permeabilities in the order of 3,000 millidarcies may be expected.

OPERATIONS - All methods of secondary recovery have been applied to the Cooper sand and where intensively applied, have, in the majority of attemps, been successful. Recent water flooding experiments indicate that this method can be profitably used in many parts of the Cooper sand field.

REMARKS - Jacks with central powers are used to pump the wells. Original initial productions were as high as 1,000 barrels of oil per day. See Forest and Warren County sections for the report on the rest of the Cooper field.

REFERENCE - Carll, John F., 1883, Pa. 2nd Geol. Survey, Rpt. I 4; Dickey, Parke D., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); unpublished data from the files of the Pa. Geol. Survey.

McKEAN COUNTY, PENNSYLVANIA

FIELD NAME Coryville FIELD No. 8
LOCATION Keating, Eldred and Annin Township
McKean County Smethport Quadrangle
DISCOVERY DATE AND WELL April 1945, Tanner well, Initial production - 4 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
Haskill (richer)	600	3 600 000	1 100 000	110 000
(poorer)	1270	5 710 000		100 000
Total	1870	9 310 000	1 100 000	210 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Haskill	1600 to 2200	40	15	6-1/4	300

PRODUCING WELLS 155 ABANDONED WELLS A few
WELL SPACING About 250 to 325 feet between wells
SAND CHARACTERISTICS - The Haskill sand is a dark chocolate brown, subangular, somewhat calcereous and micaceous, medium- to fine-grained sandstone with quartzitic overgrowths on the sand grains. The sandstone is streaked throughout with much thin interbedded gray shale. The average porosity is less than 10 percent and a maximum value of almost 16 percent while the permeability averages from less than one to 10 millidarcies with a maximum of 21 millidarcies.

OPERATIONS - This field does not look favorable for air-gas drive. A water drive project is now in operation. The water drive increased the oil production, but it is not known whether the increase in oil production paid for the project. Water drive probably will be successful in areas of maximum pay thickness, provided original wells can be used.

REMARKS - The wells are pumped by automatic electric jacks. By the end of 1947 this field had produced about 160,000 barrels of oil. Very little water is found in this horizon. A number of wells had initial productions of 25 to 30 barrels per day, but the majority quickly settled to 2 to 15 barrels on the pump and some of the marginal ones to less than one barrel. The average daily production at the end of 1946 is reported to be 800 barrels.

REFERENCE - Fettke, Charles R., and Seifert, W. H., 1946, Pa. Geol. Survey, 4th Ser., P.R. 131; Harding, Richard W., 1947, Producers Monthly, vol. XI, no. 10, pp. 26-29; unpublished data from the files of the Pa. Geol. Survey.

McKEAN COUNTY, PENNSYLVANIA

IELD NAME East Kinzua FIELD No. 14

OCATION Corydon (Corydon) Township

Kean (Warren) County Kinzua Quadrangle

ISCOVERY DATE AND WELL 1880

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
.arendon Horizon	425	1 020 000	255 000	25 000
Total	425	1 020 000	255 000	25 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Larendon	800 to 1200	60	12	6-1/4	300 to 650

'RODUCING WELLS 121 ABANDONED WELLS 4

'ELL SPACING 2 to 4 acres per well

'AND CHARACTERISTICS - The Clarendon sand consists of a bluish, pebbly, hard, ap rock a foot or two in thickness. The pebbles range up to 1/5 inch in length. nder this cap rock is a grayish, fine- to medium-grained sandstone. The pay sand s a sugar sand and occurs immediately under the cap rock or in the central part f the sand. The pay sand is sometimes called a "salt and pepper" sand since it as white and dark colored grains in it. The bottom section of the sand consists f a blue, fine-grained, almost impermeable zone.

OPERATIONS - Water flooding was attempted in this field but was unsuccessful. 'ithin the last year a gas repressuring project has been in operation and has ncreased the oil production.

REMARKS - The wells are pumped with jacks and a central power. Early initial pro- luctions ranged up to 100 barrels per well per day. In later years the initial roductions were as high as 30 barrels per well per day, but soon settled to 1/2 arrel per day. The oil does not show up very well until after the well is shot. he wells average about 1 barrel of water a week. The field has not been flooded ith fresh water. Recently a well in this field had an initial production of 60 arrels an hour. The entire field is discussed here.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from operators in the field; unpublished data from the files of the Pa. Geol. Survey.

McKEAN COUNTY, PENNSYLVANIA

FIELD NAME Guffy (Tallyho) FIELD No. 17
LOCATION Lafayette and Hamlin Towns
McKean County Bradford and Mt. Jewett Quadran
DISCOVERY DATE AND WELL 1878

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
Bradford Third	4 410	49 000 000	7 000 000	700 000
Total	4 410	49 000 000	7 000 000	700 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Bradford Third	1400 to 1900	45	33	6-1/4	300 to 500

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 240 feet between wells
SAND CHARACTERISTICS - The Bradford Third sand has an average porosity of 14.9 percent and an average permeability of 14.5 millidarcies. It is a grayish-brown to chocolate-brown sandstone, composed predominatingly of fine to very fine angular quartz grains. Occasionally a few well-rounded pebbles of transparent to milky quartz occur scattered through the sandstone.

OPERATIONS - Water flooding has been intensively practiced in this field since 1937 and has been very successful. From a project of 1590 developed acres, a total of 3,723,450 barrels of oil have been recovered between 1937 and 1946, of which 471,000 barrels represent natural production and 3,252,450 barrels represent the recovery by water flooding.

REMARKS - Considerable quantities of salt water are present in the sand on the southeast side of the field. Original initial productions ranged from 30 to 100 barrels of oil per day. About 2800 of its 4400 acres remain to be developed. About 1/3 of which is in territory that will not yield much over 1500 barrels per acre.

REFERENCE - Fettke, Charles R., 1941, Pa. Geol. Survey, 4th Ser., P.R. 125; Fettke, Charles R., 1948, Water Flooding in Pennsylvania, A.P.I., Sec. Recovery of Oil in the U.S., Rev. ed. (In press).

McKEAN COUNTY, PENNSYLVANIA

ELD NAME Kane FIELD No. 19

OCATION Wetmore (Highland and Howe) Township

cKean (Elk, Forest) County Kane Quadrangle

ISCOVERY DATE AND WELL 1881

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
ane (poorer)	1 200	3 744 000		10 000
ane (best)	1 000	3 720 000	600 000	60 000
Total	2 200	7 464 000	600 000	70 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
ane	2100 to 2500	30	12	6-1/4	450

RODUCING WELLS Unknown ABANDONED WELLS Unknown

ELL SPACING About 5 to 10 acres per well

AND CHARACTERISTICS - The Kane sand is a medium chocolate-brown, fine to very ine grained sandstone, and is somewhat calcareous in places. The average poros- ty is about 12.5 percent. The permeabilities range from .5 to 17 millidarcies ith an average of 4 millidarcies.

PERATIONS - Unsuccessful water flooding was tried in this field when very ittle was known about this method of secondary recovery. Later other water looding projects were tried with no success. A gas drive project was tried ith some success, but it was not economical to continue the project.

EMARKS - The wells are pumped with jacks and central powers. Some wells are umped with individual units. The early wells had initial productions as high s 100 barrels daily. Recent wells have initial productions from 1 to 5 barrels aily. The saturations in this field are rather low and at present it does not ook promising for secondary recovery. The remainder of this field is in Elk nd Forest Counties and will be discussed under the Elk County section.

EFERENCE - Data from present operators in the field; data from the files of he Pa. Geol. Survey.

McKEAN COUNTY, PENNSYLVANIA

(includes Sugar Run, Buck Lick, Mallory, Watson-

FIELD NAME Klondike (ville, Jungle and West Watsonville fields) FIELD No. 12

LOCATION Corydon Townsh

McKean County Kinzua Quadrang

DISCOVERY DATE AND WELL 1898, Initial production 138 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
Clarendon				
To flood	1 921	5 440 000	500 000	100 000
Poorer	544	1 740 000		
Total	? 465	7 180 000	500 000	100 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Clarendon					
Watsonville	900 to 1500	7	6	6-1/4	400 to 600
Dew Drop	900 to 1500	50	15		

PRODUCING WELLS 360 ABANDONED WELLS 114

WELL SPACING About 300 feet between wells

SAND CHARACTERISTICS - The Clarendon sand zone consists of two sandstone layers separated by a shale break, 10 to 20 feet thick. The upper sandstone, called the Watsonville, has a thickness of from 3 to 8 feet and consists of white, medium- to coarse-grained quartz sandstone. A core taken in the Watsonville sand possessed an average porosity of 14 percent and an average permeability of 617 millidarcies. The lower sandstone, called the Dew Drop, is a light gray, fine-grained, tight quartz sandstone 60 to 80 feet thick.

OPERATIONS - A water flood old-style "circle" type was operated in the Watsonville sand between 1920 and 1932. The project was successful due to the low cost of the secondary method used. There is a possibility of water flooding working successfully in this field.

REMARKS - Jacks and central powers are used to pump the wells. In some sections of the Watsonville field, salt water is produced with the oil. The Sugar Run, Buck Lick and Jungle fields produce from the Dew Drop sand. The other fields produce from the Watsonville sand. The Mallory field is completely inactive, due to watering out. Water flooding was tried in the Sugar Run field but was not successful.

REFERENCE - Fettke, Charles R., 1948, Water Flooding in Pennsylvania, A.P.I., Sec. Recovery of Oil in the U.S., Rev. ed. (In press); unpublished data from the files of the Pa. Geol. Survey.

McKEAN COUNTY, PENNSYLVANIA

FIELD NAME Lewis Run FIELD No. 9
LOCATION Lafayette Township
McKean County Bradford Quadrangle
DISCOVERY DATE AND WELL 1909

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
Lewis Run	800	3 360 000	800 000	60 000
Total	800	3 360 000	800 000	60 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Lewis Run	1500 to 1700	9	9	6-1/4	400 to 550

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 200 to 300 feet between wells
SAND CHARACTERISTICS - The Lewis Run sand is a chocolate-brown, fine-grained sandstone, varying in thickness from 6 to 12 feet. A core taken in this field ranged in porosity from 5.6 to 16 percent.

OPERATIONS - Water flooding has never been tried in this field. The sand probably will water flood, but it is thin and it probably will not be economical to use secondary recovery methods.

REMARKS - The initial production of the wells ranged from 1/2 a barrel to 8 barrels of oil per day. In some wells a little salt water occurred. Wells are pumped with jacks and central powers and with air-heads.

REFERENCE - Fettke, Charles R., 1941, Pa. Geol. Survey, 4th Ser., P.R. 131; unpublished data from the files of the Pa. Geol. Survey.

McKEAN COUNTY, PENNSYLVANIA

FIELD NAME Marshburg FIELD No. 11
LOCATION Lafayette Town
McKean County Bradford and Kinzua Quadra
DISCOVERY DATE AND WELL 1929, Mallory and Pringle well

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
Bradford Second	235	1 410 000	352 000	35 000
Total	235	1 410 000	352 000	35 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Bradford Second	1300	15	15	6-1/4	500

PRODUCING WELLS 56 in 1940 ABANDONED WELLS Unknown
WELL SPACING About 300 feet between wells
SAND CHARACTERISTICS - The Bradford Second sand is a light gray to light brownish-gray, fairly persistent, fine-grained sandstone. Chip samples of the sand range in effective porosity from 5.5 to 14.5 percent and in permeability from .2 to 8.9 millidarcies. Sometimes a lower pay occurs from 19 to 38 feet below the main producing sand and is about 9 feet thick.

OPERATIONS - About 1940 a gas drive project was tried, but was unsuccessful. The sand was too tight.

REMARKS - The wells are pumped with jacks and central powers. The wells had initial productions from 2 to 10 barrels of oil per day and are long-lived. At the end of 9 years some still averaged one barrel per day.

REFERENCE - Fettke, Charles R., 1941, Pa. Geol. Survey, 4th Ser., P.R. 125.

McKEAN COUNTY, PENNSYLVANIA

FIELD NAME Marvin Creek FIELD No. 16

LOCATION Keating Township

Kean County Smethport and Bradford Quadrangle

DISCOVERY DATE AND WELL April 1877, Haskill well, Initial production - about 1/2 barrel daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Bradford Third	320	1 150 000		10 000
Total	320	1 150 000		10 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Bradford Third	1300 to 1700	20	7	6-1/4	300 to 500

PRODUCING WELLS 85 ABANDONED WELLS 15

WELL SPACING About 200 to 500 feet between wells

SAND CHARACTERISTICS - The Bradford Third sand is a chocolate colored, fine-grained sandstone. Occasionally, a few well rounded small pebbles, of transparent to milky quartz, occur scattered through the sandstone. The sand layers usually contain considerable inter-stratified shale.

OPERATIONS - Secondary recover has not been tried in this field. It might respond to water flooding but it probably would not be economical unless the saturations are high.

REMARKS - Initial productions of wells in this field have been from 15 to 35 barrels of oil per day in the early days. These wells are pumped by jacks with central power. The wells have a long life. Initial productions at present are about 2 barrels of oil per day.

REFERENCE - Unpublished data from the files of the Pa. Geol. Survey.

McKEAN COUNTY, PENNSYLVANIA

FIELD NAME Moody Hollow FIELD No. 6
LOCATION Eldred Township
McKean County Smethport Quadrangle
DISCOVERY DATE AND WELL 1878, Gill (now Dempsey) #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Chipmunk	280	1 260 000		5 000
Total	280	1 260 000		5 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Chipmunk	900 to 1000	20	10	6-1/4	250 to 350

PRODUCING WELLS 44 ABANDONED WELLS 30
WELL SPACING About 250 to 500 feet between wells
SAND CHARACTERISTICS - The Chipmunk sand consists of a light-brown to light-gray, fine- to coarse-grained quartz sandstone with some white quartz pebbles.

OPERATIONS - In 1943 an intensive gas drive project was started and was continued for about 2 years. The production was doubled but this production was small and did not pay. A water flood was tried in this field and increased the production. The flood moved in streaks and the direction of movement could not be determined before injection. Secondary recovery does not look very promising for this field.

REMARKS - Jacks with central powers are used for pumping the wells. Initial productions were as high as 14 barrels of oil per day in later years.

REFERENCE - Fettke, Charles R., 1938, Pa. Geol. Survey, 4th Ser., Bull. M21; unpublished data from the files of the Pa. Geol. Survey.

McKEAN COUNTY, PENNSYLVANIA

FIELD NAME Music Mountain FIELD No. 10

LOCATION Lafayette Township
McKean County Bradford Quadrangle

DISCOVERY DATE AND WELL August 24, 1937, Niagara Oil Corporation well, Warrant 227
Initial production - 1000 barrels daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive gas drive (bbls.)	Recoverable by primary methods (bbls.)
Sliverville	668	2 765 000	900 000	90 000
Total	668	2 765 000	900 000	90 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Sliverville	1400 to 1600	35	19	6-1/4	300 to 500

PRODUCING WELLS 210 in 1940 ABANDONED WELLS 68 dry holes in 1940
WELL SPACING 300 to 500 feet between wells

SAND CHARACTERISTICS - The Sliverville sand consists of a light gray to light brownish-gray, medium- to coarse-grained, in part conglomeratic, sandstone. The sand ranges from being thoroughly cemented to only slightly cemented. The quartz grains are subangular to angular. Silica, as a secondary crystalline outgrowth from the original quartz grains, and a small amount of calcite form the bond. A core analysis in this sand showed an average effective porosity of 9.89 percent and an average permeability of 155 millidarcies.

OPERATIONS - The main part of the production from this field was primary, augmented to some extent by recycling the gas produced with the oil.

REMARKS - The wells are pumped with jacks and central powers and individual electric units. Salt water has not been reported in the Sliverville sand. The sand body thins rapidly beyond the margins of the field. Initial productions of the early wells were as high as 500 barrels an hour.

REFERENCE - Fettke, Charles R., 1941, Pa. Geol. Survey, 4th Ser., P. R. 125.

McKEAN COUNTY, PENNSYLVANIA

FIELD NAME Ormsby FIELD No. 15
LOCATION Hamlin and Keating Township
McKean County Mt. Jewett and Bradford Quadrangle
DISCOVERY DATE AND WELL 1891

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
Bradford Third	1 800	9 180 000	2 700 000	270 000
Kane	1 200	4 320 000	400 000	40 000
Total	3 000	13 500 000	3 100 000	310 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Bradford Third	2000 to 2300	29	12	9-7/8, 7-5/8	40, 400
Kane	2000 to 2500	28	12		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 300 feet between wells
SAND CHARACTERISTICS - The Bradford Third sand is a chocolate colored, fine-graine sandstone. Occasionally a few well rounded small pebbles of transparent to milky quartz occur scattered through the sandstone. The sand layers usually contain considerable inter-stratified shale. The average permeability is about 15 millidarcies with a high of about 70 millidarcies. The average porosity is about 15.5 percent with a high of about 25 percent. The Kane sand is a medium chocolate brown, fine to very fine grained sandstone and is somewhat calcereous in places. The average permeability is about 10 millidarcies and the average porosity 12.5 percent.

OPERATIONS - Subsurface water flooding is successful in the Bradford sand. Secondary recovery projects have not been tried in the Kane sand in this field, and at this time the success of such a project looks doubtful.

REMARKS - The wells are pumped with jacks and central powers. The initial productions of wells in this field ranged from one to 16 barrels of oil daily in the early life of the field.

REFERENCE - Fettke, Charles R., 1938, Pa. Geol. Survey, 4th Ser., Bull. M21; data from present operators in the field.

McKEAN COUNTY, PENNSYLVANIA

ELD NAME Sartwell FIELD No. 7

CATION Annin and Eldred Township

Kean County Smethport Quadrangle

SCOVERY DATE AND WELL 1898

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ... (bbls.)	Recoverable by primary methods (bbls.)
skill (producing)	723	2 170 000		300 000
(undrilled)	877	2 630 000		
(inactive)	1 055	3 165 000		
Total	2 655	7 965 000		300 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
skill	1600	13	9	6-1/4	300

ODUCING WELLS 63 ABANDONED WELLS About 300

ELL SPACING 200 to 500 feet between wells

ND CHARACTERISTICS - The Haskill sand is a very dark brown, very fine grained, some-at calcareous and micaceous sandstone, streaked throughout with many thin shale breaks. is sand is divided into two sections, with the upper section about 20 feet thick, ich is the best part of the sand, and the lower poorer part consists of sandstone th interbedded shale. A core from this area had an average porosity of about 10 rcent and an average permeability of 2.51 millidarcies.

PERATIONS - One water flooding project was tried in 1929, but is out of operation present. Water flooding in this field as yet does not look favorable.

EMARKS - The Bradford sand contains salt water in this area. Wells are pumped th jacks and central powers.

EFERENCE - Unpublished data from the files of the Pa. Geol. Survey.

FIELD NAME Shingle House (includes Kings Run and Jander Run fields) FIELD No.
LOCATION Ceres (Sharon) Smethport and Coudersport
McKean (Potter) County
DISCOVERY DATE AND WELL 1895, discovered by drilling of gas well

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary meth (bbls.)
Bradford Third				
(poorer)	660	3 960 000		
(richer)	1 500	11 700 000	2 700 000	50 000
Total	2 160	15 660 000	2 700 000	50 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Bradford Third	960 to 1370	30	20	6-1/4	200 to 800

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 350 feet between wells
SAND CHARACTERISTICS - The Bradford Third sand is a grayish-brown to chocolate brown sandstone, composed predominatingly of fine to very fine quartz grains. Some shale partings occur throughout the sand body. The location and thickness of these shale partings in the sand vary considerably. The producing horizon in this area sometimes consists of a top sandy zone about 30 feet thick, followed by a 15 foot shale break and then about 14 feet of sand which contains oil. The porosity averages about 16 percent and the permeability about 13 millidarcies.

OPERATIONS - An intensive water flooding project has proven very successful. About 1500 acres are probably floodable.

REMARKS - The wells are pumped with jacks and central power, with individual gas engine units and with air-heads. The present initial production is about 1/2 barrel daily per well. The oil to water ratio is about one to one. Probably the first well drilled in this general area, which produced oil, was the Richburg well, drilled in New York state in 1881. Part of this field is in Potter County and is discussed in that section.

REFERENCE - Data from present operators in the field.

McKEAN COUNTY, PENNSYLVANIA

AME West Branch FIELD No. 13

ON Bradford Township

County Bradford Quadrangle

ID WELL About 1880

RESERVE ESTIMATE AS OF JANUARY 1, 1947

ducing ...v is ...	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ... (bbls.)	Recoverable by primary methods (bbls.)
d Second	512	4 380 000		
Total	512	4 380 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
dford Second	800 to 1400	60	30	6-1/4	500

DUCING WELLS Unknown ABANDONED WELLS Unknown

LL SPACING About 300 feet between wells

ND CHARACTERISTICS - The upper two-thirds of the Bradford second sand consists a light gray to nearly white, medium- to coarse-grained quartz sandstone, with e small well-rounded quartz pebbles up to 4 millimeters in diameter. The lower is light brown in color and finer in texture. The sandstone is only slightly careous, but has been thoroughly cemented by secondary silica. A core showed an rage porosity of 12.58 percent and an average permeability of 488.39 millidarcies. osities ranged from 6.04 to 17.64 percent, permeabilities from 0.03 to 3165 lidarcies.

ERATIONS - A small scale water flooding experiment employing a two-way drive y, was conducted during 1936 and 1937. The experiment was unsuccessful. ondary recovery in this field does not look favorable.

MARKS - The initial production of wells in this field were as high as 25 barrels oil per day and the wells proved to be long lived. Outside the productive as shows of oil and some salt water are commonly reported. The wells are pumped jacks and central powers.

FERENCE - Fettke, Charles R., 1938, Pa. Geol. Survey, 4th Ser., Bull. M21; Fettke, rles R., 1948, Water Flooding in Pennsylvania, A.P.I., Sec. Recovery of Oil in U.S., Rev. ed. (In press).

McKEAN COUNTY, PENNSYLVANIA

FIELD NAME Windfall FIELD No. 4
LOCATION Eldred and Otto Townshi
McKean County Smethport Quadrangl
DISCOVERY DATE AND WELL 1875

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
Bradford Third	925	6 550 000	1 500 000	150 000
Total	925	6 550 000	1 500 000	150 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Bradford Third	1300	50	20	6-1/4	300

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 200 to 300 feet between wells
SAND CHARACTERISTICS - The Bradford Third sand is a chocolate brown sandstone, composed predominantly of fine to very fine angular quartz grains. Occasionally a few well-rounded small pebbles of transparent to milky quartz, are scattered through the sandstone. These are mostly in the upper layers and only rarely constitute any appreciable volume of the rock. At least two beds of sandstone are usually reported, an upper one about 12 feet thick and a lower one 10 feet thick, separated by about 14 feet of shale. Sometimes a third layer occurs below the second and is separated from it by about 14 feet of shale. The sand layers usually contain considerable inter-stratified shale.

OPERATIONS - Water flooding projects are in the developmental stage in this field. About 680 undeveloped acres of this field are looked on as being favorable for water flooding and possibly will yield 1500 or more barrels per acre.

REMARKS - The wells are pumped by jacks and central powers and individual electric units. Not much salt water is found in the producing sand during primary production. According to Pa. Geol. Survey, 4th Ser., Bull. M19, the field was discovered in 1881.

REFERENCE - Fettke, Charles R., Pa. Geol. Survey, 4th Ser., Bull. M21; Fettke, Charles R., 1948, Water Flooding in Pennsylvania, A.P.I., Sec. Recovery of Oil in the U.S., Rev. ed. (In press).

MERCER COUNTY, PENNSYLVANIA

FIELD NAME Cool Spring FIELD No. 72

LOCATION Cool Spring Township

Mercer County Stoneboro and Mercer Quadrangle

DISCOVERY DATE AND WELL 1912, Hunter #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	500	600 000		
Total	500	600 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	700	20	6	6-1/4	400

PRODUCING WELLS None ABANDONED WELLS 30

WELL SPACING About 600 to 1000 feet between wells

SAND CHARACTERISTICS - The Hundred Foot sand is a white, medium coarse, loose sand containing thin lenses of shale.

OPERATIONS - Secondary recovery was never tried. The field is flooded with fresh water. It is doubtful whether secondary recovery methods would work in this field.

REMARKS - The field has been completely inactive since 1924. The average initial production of the early wells was about 35 barrels per day of black oil. The wells produced very little water. They were pumped with jacks and a central power or individual pumping units.

REFERENCE - Data from former operator in the field.

MERCER COUNTY, PENNSYLVANIA

FIELD NAME Raymilton FIELD No. 68
LOCATION Sandy Lake, Worth (French Creek and Mineral) Townsl
Mercer (Venango) County Franklin and Stoneboro Quadran
DISCOVERY DATE AND WELL 1870

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Third	800	2 400 000	480 000	48 000
Total	800	2 400 000	480 000	48 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Third	760 to 1080	10	10	6-1/4	500 to 800

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 1 well to 2 acres
SAND CHARACTERISTICS - The Third sand, except for the top 1 to 2 feet which contains small pebbles, is uniform and fine-grained and is all pay. The porosity averages 12 percent and the permeability is generally 10 millidarcies or less. The sand contains very little water.

OPERATIONS - An air drive project in this field has been successful.

REMARKS - The largest initial production was 150 barrels of oil per day. New wells now have initial productions of 1 to 2 barrels of oil per day and almost no salt water. Part of the Raymilton field is in Venango county and is discussed in that section. The wells are pumped with jacks and central powers.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Sherrill, R. E., and Matteson, L. S., 1941, Pa. Geol. Survey, 4th Ser., Bull. M24.

MERCER COUNTY, PENNSYLVANIA

ELD NAME Volant FIELD No. 73
)CATION Springfield (Washington) Township
rcer (Lawrence) County Neshannock and Mercer Quadrangle
ISCOVERY DATE AND WELL April 1906, C. N. Drake well, Initial production - 6
rrels daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
ndred Foot	3 200	4 160 000	540 000	54 000
Total	3 200	4 160 000	540 000	54 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
ndred Foot	600 to 925	20	6	6-1/4	350 to 650

RODUCING WELLS 100 ABANDONED WELLS Unknown
ELL SPACING 2 to 6 acres per well
AND CHARACTERISTICS - The Hundred Foot sand is a white, medium coarse, loose nd containing thin lenses of shale. The pay is found in the middle of the sand. e average porosity is 8.4 percent.

PERATIONS - Air-gas drive in this field has been successful. The project in- eased the production on the average from 1/8 to 1/4 of a barrel per day per well.

EMARKS - The wells are pumped with jacks and a central power. At an average pth of about 150 feet below the surface a great deal of trouble with corrosion casing is experienced. The initial productions of early wells were as much 25 barrels of oil per day. The above discussion covers the entire field.

EFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator r National Defense (Unpublished); data from present operators in the field.

POTTER COUNTY, PENNSYLVANIA

FIELD NAME Hebron Center FIELD No. 2
LOCATION Hebron Town
Potter County Coudersport Quadrangle
DISCOVERY DATE AND WELL About 1908

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
Bradford Third	90	240 000	(very little)	(very little)
Total	90	240 000	(very little)	(very little)

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Bradford Third	1218 to 1573	9.3	9.1	6-1/4	350

PRODUCING WELLS 32 ABANDONED WELLS Unknown
WELL SPACING 263 feet between wells
SAND CHARACTERISTICS - The Bradford Third sand has an average porosity of 14.6 percent and an average permeability of 9.37 millidarcies. It is a grayish-brown to chocolate brown sandstone, composed predominatingly of fine to very fine angular quartz grains. Occasionally a few well-rounded quartz pebbles occur scattered through the sandstone. Wide variations in total thickness and number and thickness of shale partings, occur in this sand.

OPERATIONS - A water drive project was started in this field in 1940 and was successful. At present the project has almost reached its economic limit. 175,000 barrels of oil have been produced between 1940 and 1946 by water flooding in this field.

REMARKS - There are 35 water in-take wells also in this field. The oil wells are pumped with jacks and central powers. The original development of this field started about 1908 when 9 wells were drilled. One well had an initial production of 60 barrels per day. The oil was piped to a nearby railroad and shipped in tank cars. Trouble due to the high viscosity of the oil was experienced and the wells were pulled about 1917 when salvage prices were high. The present development started about 1935.

REFERENCE - Fettke, Charles R., 1948, Water Flooding in Pennsylvania, A.P.I., Sec. Recovery of Oil in the U.S., Rev. ed. (In press).

POTTER COUNTY, PENNSYLVANIA

ELD NAME Shingle House (includes Kings Run and Jander Run fields) FIELD No. 3

OCATION Sharon (Ceres) Township
tter (McKean) County Coudersport and Smethport Quadrangle

ISCOVERY DATE AND WELL 1895

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
adford Third				
(poorer)	1 330	7 980 000		
(richer)	3 000	23 400 000	5 400 000	100 000
Total	4 330	31 380 000	5 400 000	100 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
adford Third	960 to 1370	30	20	6-1/4	200 to 800

RODUCING WELLS Unknown ABANDONED WELLS Unknown

ELL SPACING About 350 feet between wells

AND CHARACTERISTICS - The Bradford Third sand is a grayish-brown to a chocolate own sandstone, composed predominatingly of fine to very fine quartz grains. Some ale partings occur throughout the sand body. The location and thickness of these ale partings in the sand vary considerably. The producing horizon in this area metimes consists of a top sandy zone about 30 feet thick, followed by a 15 foot ale break and then about 14 feet of sand which contains oil. The porosity aver- es about 16 percent and the permeability about 13 millidarcies.

PERATIONS - An intensive water flooding project has proven very successful. out 3000 acres are probably floodable.

EMARKS - The wells are pumped with jacks and central power, with individual gas gine units and with air heads. The present initial productions are about 1/2 rrel daily per well. The oil to water ratio is about 1 to 1. Probably the first ll drilled in this horizon, which produced oil, was the Richburg well, drilled in w York State in 1881. Part of this field is in McKean County and is discussed in at section.

EFERENCE - Data from present operators in the field.

TIOGA COUNTY, PENNSYLVANIA

FIELD NAME Gaines FIELD No. 1
LOCATION Marshlands Town
Tioga County Galeton Quadrat
DISCOVERY DATE AND WELL 1898, Atwell #1, Initial production - 10 barrels daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ... (bbls.)	Recoverable by primary methods (bbls.)
Atwell	280	2 190 000		15 000
Blossburg	170			
Total	450	2 190 000		15 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Atwell	775	30	12	6-1/4	400
Blossburg	575	(see below)	(see below)	6-1/4	500

PRODUCING WELLS 56 ABANDONED WELLS 70
WELL SPACING 283 feet between wells
SAND CHARACTERISTICS - The Atwell sand is uniformly fine-grained and possesses a very dark chocolate brown color. The average porosity is 19 percent with a maximum of 26 percent and the average permeability is 75 millidarcies with a maximum of 330 millidarcies. The Blossburg formation consists of a series of alternating shaly sandstones, shales, shaly limestones, and thin limestones. Oil appeared to come from open bedding and joint planes or fissures.

OPERATIONS - A water flood project was started in the Watrous field in 194?. The experiment was a failure possibly due to the fact that the paraffin point of the crude oil is in the proximity of the formation temperature and suggests that part of the oil saturation reported in the core analyses consists of paraffin wax that cannot be recovered by water flooding. From the chloride content of the water it would seem to indicate that fresh water had entered the sand from improperly plugged wells and watered out extensive areas prior to the start of the experiment.

REMARKS - The Gaines field consists of two pools. One pool produced from the Atwell sand and is called Watrous. The other pool produced from the Blossburg formation and is called Manhattan. The Blossburg formation is not suited for secondary recovery and no reserve estimate was made. Initial productions of wells in the Atwell sand averaged 25 with a maximum of 40 barrels of oil per day in the early days. The original initial productions of wells in the Blossburg formation ranged from a few barrels of oil per day to 2,100 barrels per day from Blossburg #4.

REFERENCE - Fettke, Charles R., 1948, Water Flooding in Pennsylvania, A.P.I., Sec. Recovery of Oil in the U.S., Rev. ed. (In press); Fuller, M. L., 1903, U. S. Geol. Survey, Geol. Atlas 92.

VENANGO COUNTY, PENNSYLVANIA

ELD NAME Black Hill FIELD No. 70
CATION Rockland Township
nango County Foxburg and Oil City Quadrangle
SCOVERY DATE AND WELL 1873

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
d Valley	730	4 400 000	730 000	70 000
Total	730	4 400 000	730 000	70 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
d Valley	550 to 960	25	20	5-5/8	300

ODUCING WELLS 12 ABANDONED WELLS About 75
ELL SPACING About 300 feet average between wells
ND CHARACTERISTICS - The Red Valley sand consists of a brownish, coarse sandstone with a pebble streak on top and changing to a sugar pay sand about 10 feet the sand. The pebbles in the upper part of the sand range up to 3/10 inch in ngth.

PERATIONS - Vacuum and air drive was tried in this field on a very small scale. e vacuum and air drive were both applied (at separate times) at the casing head. e vacuum and air drive therefore affected all formations from the bottom of the sing to the bottom of the well. The only change was a small increase in the gas lume during the air drive.

EMARKS - In the early days the wells were pumped with individual gas engine units. ter central powers were installed. In 1885 S. Batton #2 with an initial production of 60 barrels a day started the intense development of the field. Early initial oductions were as high as 200 barrels of oil per day. The average production today about 1/8 of a barrel per well per day. Some wells produce a great deal of water. the sand is drilled through large quantities of water are encountered. This is id to be salt water, but it probably is being fed with fresh water from some orly plugged well.

EFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for tional Defense (Unpublished); data from former operator in the field.

VENANGO COUNTY, PENNSYLVANIA

FIELD NAME Breedtown FIELD No. 51
LOCATION Cherrytree Townsh
Venango County Titusville Quadrang
DISCOVERY DATE AND WELL 1908, E. E. Staub #1

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Third Stray	1 160	2 320 000	280 000	28 000
Total	1 160	2 320 000	280 000	28 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Third Stray	800	10	10	5-5/8	300

PRODUCING WELLS 190 ABANDONED WELLS 62
WELL SPACING About 300 feet between wells
SAND CHARACTERISTICS - The Third Stray sand is a dark gray, medium-grained, shaly sandstone containing a few pebbles. The First sand, which is spotty in production, is about 40 feet thick. It is a sugar sand with pebbles up to 1/2 inch in length at the top of the sand. Below this sand is a shale break with Amber sand below it.

OPERATIONS - One secondary project was attempted and the injected air blew through the pebble streak of the First sand. This repressuring project doubled the oil production, but was abandoned due to the very high permeability of the First sand. The Third Stray sand will probably repressure successfully.

REMARKS - The wells are pumped with jacks and a central power. The initial productions of early wells were about 10 barrels per day. The wells at present produce only a small amount of oil. The oil to water ratio is about 1 to 5.

REFERENCE - Dickey, Parke A., 1941, Pa. Geol. Survey, 4th Ser., Bull. M22; Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

VENANGO COUNTY, PENNSYLVANIA

IELD NAME Bullion - Clintonville (includes Kennerdel field) FIELD No. 69

)CATION Clinton, Irwin (Marion and Venango) Township
'nango (Butler) County Hilliards and Franklin Quadrangle

ISCOVERY DATE AND WELL About 1860, Martin well, Initial production - 1,000 barrels
:ily; Kennerdel - 1876.

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
cond	12 170	53 600 000	10 640 000	1 064 000
ird	4 785	19 500 000	3 500 000	350 000
Total	16 955	73 100 000	14 140 000	1 414 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
cond	850 to 1250	28	10	6-1/4,	200 to 600,
ird	600 to 1300	15	10	4-1/4	750 to 1150

RODUCING WELLS Unknown ABANDONED WELLS Unknown

'ELL SPACING About 300 feet between wells

AND CHARACTERISTICS - The Second sand varies from a fine-grained sandstone in ie main field to a coarse and pebbly sandstone in the small fields. The porosity s estimated at 20 percent with permeability less than 10 millidarcies over most of ie main field and in the order of several hundred millidarcies in the small ones. ie Third sand ranges from a uniform medium-grained sand to a conglomeratic sand. ie porosity in the poorer parts of the field averages 11 percent and higher in the etter parts. The permeability ranges from less than one to 50 millidarcies in the iner more uniform sand to 3,500 or more in the more open sand.

)PERATIONS - Air-gas drive projects have been successful in the Second and Third ands. A water flood project in the Second was not successful. The Third sand has een subjected to vacuum for years and at present is still successfully practiced n some of the leases.

EMARKS - The wells are pumped with jacks and central powers. Corrosion due to ater in the basal Pennsylvania Coal Measures is so severe in some cases that the -1/4 inch string must be cemented in or replaced every 2 or 3 years. One of the argest wells, the Rapp well, drilled about 1906, produced about 2,000 barrels of il per day. Some wells had initial productions of 3,500 barrels of oil per day. resent initial productions of wells in this field are about one barrel of oil per lay. About 1,000 acres of Second sand production are inactive. Part of this field s in Butler County and is reported in that section.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for Tational Defense (Unpublished); Sherrill, R. E., and Matteson, L. S., 1939, Pa. Geol. Survey, 4th Ser., P. R. 122.

VENANGO COUNTY, PENNSYLVANIA

FIELD NAME Cherrytree FIELD No. 53
LOCATION Cherrytree Township
Venango County Titusville Quadrangl
DISCOVERY DATE AND WELL 1868, Stewart #1

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Third	875	5 000 000	1 000 000	100 000
Total	875	5 000 000	1 000 000	100 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Third	950	25	15	6-1/4	300

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 300 feet between wells
SAND CHARACTERISTICS - The Third sand contains scattered pebbles in sandstone or shaly sandstone in the upper and lower parts of the sand. The main body of the sand consists of fine- to medium-grained sandstone with abundant thin shaly partings, often very irregular, and with small lumps and balls of shale. The permeability is usually less than 100 millidarcies with a porosity of about 14 percent.

OPERATIONS - An air drive project has been in successful operation for a number of years. The air drive increased the oil production 8 fold.

REMARKS - The wells are pumped with jacks and a central power. In the early days wells had initial productions up to 15 barrels per day and later up to 60 barrels per day. Some of the early wells flowed. The early wells generally had a large flow of gas. The wells produce at present about 1 barrel of water and 1/8 barrel of oil per day. The First and Amber sands have spotted production in this field.

REFERENCE - Dickey, Parke A., 1941, Pa. Geol. Survey, 4th Ser., Bull. M22; Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

ELD NAME Cranberry - Rockland FIELD No. 66

)CATION Cranberry, Rockland and Richland Township

:nango County Oil City Quadrangle

ISCOVERY DATE AND WELL Cranberry - 1872; Rockland - Judd and Geiser well, Initial 'oduction - 23 barrels daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
irst	650	1 650 000	264 000	26 000
ed Valley	1 486	5 560 000	890 000	89 000
ray	10 925	54 620 000	8 736 000	874 000
hird	980	5 600 000	902 000	90 000
Total	14 041	67 430 000	10 792 000	1 079 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
irst	800	40	10	6-1/4	300 to 500
ed Valley	900	40	10		
ray	1050	25	10		
hird	1100	45	12		

RODUCING WELLS Unknown ABANDONED WELLS Unknown

'ELL SPACING About 300 feet between wells

AND CHARACTERISTICS - The First sand varies from a yellow, fine- to medium-grained andstone to a white, coarse, pebbly sandstone. The oil pay is found in the bottom. :e Red Valley sand is generally a gray to white sugar sand containing some pebbles. he Gray sand consists of 10 feet of a broken shaly formation, then 10 feet of fine ray sand and the bottom 10 feet of coarse chocolate sand which is the pay streak. he Third sand is fine- to medium-grained and in places coarse with abundant pebbles n conglomerate beds and scattered through the sand. Thin beds of shale are common. mall lumps or knots of shale are present.

)PERATIONS - The Red Valley sand is being successfully repressured with gas. Oil roduction in some areas increased as much as ten times. Attempts were made to re-ressure with gas and flood with water in the Gray sand, but both projects were un-uccessful. Part of this field was operated under vacuum. A gas drive was applied o the Third sand and was very successful. Vacuum was applied in the early life of he field and was discontinued about 1935.

EMARKS - The wells are pumped with jacks and central powers. The First sand wells had arly initial productions as high as 175 barrels daily. About 300 acres are inactive. ells in the Red Valley sand had initial productions up to several hundred barrels daily. considerable amount of water is pumped with the oil. The initial productions of wells n the Gray sand were up to 100 barrels daily in the early days and averaged about 25 bar-els daily. Present initial productions are from 3 to 5 barrels daily. The average daily roductions of the old wells is about 1/10 of a barrel daily. About 545 acres of Gray and are inactive. The initial productions of the early wells in the Third sand ranged up o 800 barrels daily. Recent wells had initial productions as high as 17 barrels daily. ome of the Third sand is flooded with water. About 3400 acres are inactive.

EFERENCE

ickey, Parke A., Sherrill, R. E., and Matteson, L. S., 1943, Pa. Geol. Survey, 4th er., Bull. M25.

VENANGO COUNTY, PENNSYLVANIA

FIELD NAME Emlenton - Richey Run FIELD No. 71
LOCATION Scrubgrass, Richland (Allegheny) Township
Venango County Hilliards and Foxburg Quadrangle
DISCOVERY DATE AND WELL 1879

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Boulder	1 860	3 700 000	620 000	60 000
Third	5 000	20 000 000	3 250 000	335 000
Total	6 860	23 700 000	3 870 000	395 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Boulder	1150 to 1375	10	5	6-1/4	300 to 500
Third	1200 to 1425	25	10		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 1 well to 2 acres
SAND CHARACTERISTICS - The Boulder consists of a chocolate colored, coarse-grained, pebbly pay in the top with a lighter, finer sand below. The Third sand consists of a gray, hard, fine-grained, shaly sandstone with three coarse pebbly pays. The top pay is about 7 to 14 feet in the sand, the next pay is from 17 to 21 feet in and the bottom pay from 25 feet to 28 feet in the sand.

OPERATIONS - Gas drive projects in the area have been successful.

REMARKS - Jacks and central powers are used to pump the wells. Third sand wells originally had initial productions up to 500 barrels of oil per day. Wells from the Boulder sand have not been large. A small portion of this field is reported in the Knox field, Clarion County section.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Shaw, E. W., and Munn, M. J., 1911 b, U.S. Geol. Survey, Bull. 454; Shaw, E. W., Lines, E. F., and Munn, M. J., 1911, U. S. Geol. Survey, Geol. Atlas 178.

VENANGO COUNTY, PENNSYLVANIA

Foster - Reno

ELD NAME (includes Bully Hill, Victory and Bredinsburg fields) FIELD No. 64

CATION Victory, Sandy Creek, Rockland, Cranberry and Sugar Creek Township
nango County Oil City and Franklin Quadrangle

SCOVERY DATE AND WELL 1859, Hoover and Stewart well, Initial production - 25 rrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
cond	13 770	77 720 000	14 640 000	1 464 000
ird Stray	550	1 650 000	264 000	26 000
ird	1 555	5 660 000	992 000	99 000
Total	15 875	85 030 000	15 896 000	1 589 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
cond	390 to 1080	24	17	6-1/4	200 to 500
ird Stray	500 to 1000	15	10		
ird	530 to 1230	13	10		

ODUCING WELLS Unknown ABANDONED WELLS Unknown

ELL SPACING 250 to 350 feet between wells

ND CHARACTERISTICS - The Second sand consists of alternating layers of pebble nd, "sugar" sand, and a few layers of very fine grained hard sand. The pebbles e generally flat and rounded or elliptical in outline. The sand is firmly cement- d regardless of grain size. The permeability is generally less than 100 millidar- ies. The Third Stray sand ranges from fine-grained to pebbly with an average por- sity of 14.9 percent and a maximum permeability of 22 millidarcies. The Third sand anges from a pebbly, poorly cemented sand to a finer-grained and tighter sand.

PERATIONS - Air drive projects in the Second sand have been successful. Air drive as not been tried in the Third sand or Third Stray sand.

EMARKS - The wells are pumped with jacks and central powers. Some initial pro- uctions of the early Second sand wells were up to 50 barrels a day. The average aily production at present of wells outside of the air drive area is about 1/10 f a barrel. Some wells produce 5 times as much water as oil. The initial produc- ions of the Third Stray sand wells were as high as 15 barrels a day for the early ells. Most of the Third Stray sand area is inactive. The early Third sand wells ad initial productions as high as 300 barrels a day. The average present daily roduction is 1/10 of a barrel.

EFERENCE - Sherrill, R. E., and Matteson, L. S., 1941, Pa. Geol. Survey, 4th Ser., ull. M24.

VENANGO COUNTY, PENNSYLVANIA

FIELD NAME Franklin - Oak Forest (includes outlying areas) FIELD No. 63
LOCATION Sugar Creek Township
Venango County Franklin Quadrang
DISCOVERY DATE AND WELL 1859, Evans #1, Initial production - 15 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
First				
(Franklin)	4 420	43 000 000	3 340 000	334 000
(Oak Forest)	1 000	10 000 000	1 200 000	120 000
(Outlying areas)	500	2 000 000	200 000	20 000
Total	5 920	55 000 000	4 740 000	474 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
First					
(Franklin)	270 to 750	50	20	6-1/4	120 to 400
(Oak Forest)	450 to 700	55	25		
(Outlying areas)	500 to 800	40	15		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 300 feet between wells
SAND CHARACTERISTICS - The First sand in the Franklin field ranges in texture from fine-grained to pebbly. The pay part of the sand lies in the lower portion of it and constitutes 50 to 60 percent of the total sand thickness. The average porosity of the sand in the cored wells is 13.9 percent with a horizontal permeability ranging from 0 to 19,000 millidarcies. The First sand in the Oak Forest field is fine-grained to pebbly and locally is very permeable. The top 25 feet is considered pay sand. The First sand in the outlying areas ranges from a medium- to coarse-grained sandstone.

OPERATIONS - The use of vacuum, which was initiated in 1920, has been practiced in most of the field and has proven successful in increasing the oil production. Air drive projects increased oil production appreciably, but by-passing occurred within so short a time as to discourage continuance of the projects. An intensive water flood experiment was attempted, but it was not successful.

REMARKS - The Oak Forest field and most of the outlying areas are inactive. Initial productions of early wells were as high as 150 barrels daily. Present average daily production per well ranges from 1/8 to 5/16 barrels. Salt water is present in large quantities. The daily production of salt water per well ranges up to 27 barrels or more and averages 7 barrels. An accidental water flood is operating in the northeast and south edges of the field. The wells are pumped 24 hours a day. Trouble is experienced with corrosion resulting from the produced water.

REFERENCE - Sherrill, R. E., and Matteson, L. S., 1941, Pa. Geol. Survey, 4th Ser., Bull. M24.

VENANGO COUNTY, PENNSYLVANIA

FIELD NAME Hamilton Corners FIELD No. 52
LOCATION Oakland and Cherrytree Township
Venango County Titusville and Townville Quadrangle
DISCOVERY DATE AND WELL 1904

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive gas drive or air (bbls.)	Recoverable by primary methods (bbls.)
First	1 000	4 400 000	700 000	70 000
Total	1 000	4 400 000	700 000	70 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
First	500	41	20	6-1/4	250

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 2 to 5 acres per well
SAND CHARACTERISTICS - The First sand is very variable in character. It is frequently pebbly or coarse in certain beds. The porosity ranges from 10 to 22 percent and the permeability from 10 to 700 millidarcies and occasionally higher.

OPERATIONS - Air drive methods were applied to this field experimentally in 1916. The well spacings were rather wide but the method applied was successful.

REMARKS - The most important part of this field in the vicinity of Prather School has a 30 to 40 foot pay sand. The First sand in the eastern area is generally shaly and with a low porosity. The wells are pumped with jacks and a central power.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Dickey, Parke A., 1941, Pa. Geol. Survey, 4th Ser., Bull. M22.

VENANGO COUNTY, PENNSYLVANIA

FIELD NAME Hampton - Strong FIELD No. 65

LOCATION Cranberry, Pinegrove and President Townsl

Venango County Oil City and Tionesta Quadrang

DISCOVERY DATE AND WELL 1885, Saddlers Corners well, Initial production - about 25 barrels daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive gas drive air or (bbls.)	Recoverable by primary methods (bbls.)
Red Valley	743	2 780 000	445 000	44 000
Second	465	2 325 000	372 000	37 000
Gray	6 625	32 821 000	5 241 000	524 000
Total	7 833	37 926 000	6 058 000	605 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Red Valley	625 to 900	20	5	6-1/4	250 to 500
Second	900	25	7		
Gray	750 to 1050	20	15		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING About 300 feet between wells

SAND CHARACTERISTICS - The Red Valley sand is fine-grained and hard with permeabilities ranging from 3 to 15 millidarcies and an average porosity of 10 percent. In some areas the sand is pebbly. The Second sand is loose and coarse, changing to hard and pebbly. The pay is generally found in the lower part of the sand. The porosity is about 11 percent. The Gray sand is a fine- to medium-grained sand, usually having pebbles at the top. The sand is usually loose, but occasionally contains very hard streaks. The best pay is found at the bottom of the sand.

OPERATIONS - Vacuum has been applied to the field since 1918 and it has increased the oil production materially. A gas drive project in this field was successful.

REMARKS - The wells are pumped with jacks and central powers. Initial productions of wells in the Red Valley sand were rather small. Early Gray sand wells had initial productions as high as 400 barrels daily. Very little salt water is produced with the oil. Certain areas have been accidently flooded by water. About 700 acres are inactive.

REFERENCE - Dickey, Parke A., Sherrill, R. E., and Matteson, L. S., 1943, Pa. Geol. Survey, 4th Ser., Bull. M25.

VENANGO COUNTY, PENNSYLVANIA

ELD NAME Oakland FIELD No. 59
OCATION Oakland Township
enango County Titusville and Oil City Quadrangle
ISCOVERY DATE AND WELL 1900, Initial production 25 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
irst	1 050	4 300 000	730 000	73 000
hird Stray	50	150 000	50 000	5 000
Total	1 100	4 450 000	780 000	78 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
irst	600	40	15	6-1/4	350
hird Stray	850	12	(not determined)		

RODUCING WELLS Unknown ABANDONED WELLS Unknown
VELL SPACING From 2 to 5 acres per well
AND CHARACTERISTICS - The First sand is white, coarse-grained and very loose ith the pay sand in the lower part of the formation. The Third Stray sand, where roductive, is a soft pebbly sand.

OPERATIONS - Some air drive projects have been operating in this field, but the esults have been discouraging because of the very loose nature of the sand.

REMARKS - Original initial productions ranged as high as 100 barrels of oil per day. Today newly drilled wells come in from 1/2 to 3 barrels of oil per day. Wells are pumped with jacks and a central power. About 130 acres of First sand are inactive.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Dickey, Parke A., 1941, Pa. Geol. Survey, 4th Ser., Bull. M22; Dickey, Parke A., Sherrill, R. E., and Matteson, L. S., 1943, Pa. Geol. Survey, 4th Ser., Bull. M25.

VENANGO COUNTY, PENNSYLVANIA

FIELD NAME Octave FIELD No. 50
LOCATION Cherrytree Townsl
Venango County Titusville Quadran
DISCOVERY DATE AND WELL August 27, 1859, Drake well, Initial production - 10 barre dail

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Third	1 360	13 000 000	2 500 000	250 000
Total	1 360	13 000 000	2 500 000	250 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Third	450 to 920	30	10	6-1/4	300

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 300 feet between wells
SAND CHARACTERISTICS - The Third sand is markedly streaked and lobate, with bars of thick, pebbly sand separated by thinner, finer and relatively barren areas. The permeability ranges from low to over 1,000 millidarcies in the pebbly zone. The pebbles in the sand are up to 1/2 inch in length and generally occur in the top and bottom sections of the sand. The gray sugar sand is usually the pay sand.

OPERATIONS - The thicker parts of the field have been operated mostly with vacuum. Air drive projects have been operating successfully in recent years. Some projects have doubled their oil production.

REMARKS - The wells are pumped with jacks and a central power. The early wells had initial productions as high as 3,000 barrels per day and produced lots of gas. The initial productions at present are as much as 30 barrels a day in areas that have been subjected to intensive air drive. The average well produces about 1/3 of a barrel of oil per day. The oil to water ratio is about 1 to 2.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Dickey, Parke A., 1941, Pa. Geol. Survey, 4th Ser., Bull. M22; data from present operators in the field.

VENANGO COUNTY, PENNSYLVANIA

IELD NAME Oil City - Rouseville FIELD No. 60

OCATION Cornplanter and Sugar Creek Township

enango County Oil City Quadrangle

ISCOVERY DATE AND WELL 1861, Phillips well, Initial production - 3900 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
econd	14 165	84 990 000	17 000 000	1 700 000
ray	1 780	6 670 000	712 000	71 000
hird	6 760	21 700 000	3 532 000	353 000
Total	22 705	113 360 000	21 244 000	2 124 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
econd	600	25	12	6-1/4	350
ray	720	15	8		
hird	800	15	6		

RODUCING WELLS Unknown ABANDONED WELLS Unknown

/ELL SPACING About 300 feet between wells

AND CHARACTERISTICS - The Second sand is light gray, fine-grained, hard, with ccasional pebbly zones 3 to 5 feet thick near the top of the sand. The pay is enerally found in the top, but in places may be present in the middle and bottom f the sand. The porosities average about 17 percent with permeabilities ranging rom 8 to 200 millidarcies. The Gray sand is usually rather fine-grained and not ebbly. The Third sand is pebbly and pebbles are more abundant in the upper part f the sand body. The permeability is extremely variable, ranging from several housand millidarcies in the pebble beds to less than one millidarcy average in he finer and poorer parts of the sand.

PERATIONS - Suction was never extensively applied to the Second sand. Most of he Second sand is being successfully operated under air drives. Several attempts o flood this sand with water were not successful. There are no air or gas drive perations in the Gray sand. Suction was applied to the Third sand in 1920. Since 930 parts of this sand have been repressured with air.

EMARKS - The wells are pumped with jacks and a central power. Early initial productions in the Second sand were as high as 900 barrels daily. Present initial productions range from 1/2 to 5 barrels daily. Initial productions of the early wells n the Gray sand were as much as 3,000 barrels daily. The average daily production t present is about 1/10 of a barrel for each well. The oil to water ratio is about ne to one for wells in this field.

EFERENCE - Dickey, Parke A., Sherrill, R. E., and Matteson, L. S., 1943, Pa. eol. Survey, 4th Ser., Bull. M25.

VENANGO COUNTY, PENNSYLVANIA

FIELD NAME Petroleum Center - Pioneer FIELD No. 58
LOCATION Cherry Tree and Cornplanter Townsh
Venango County Titusville Quadrang
DISCOVERY DATE AND WELL Spring of 1861

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
First	1 200	5 000 000	800 000	80 000
Second	3 000	15 000 000	2 000 000	200 000
Third	3 800	25 000 000	5 000 000	500 000
Total	8 000	45 000 000	7 800 000	780 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
First	420	50	15	6-1/4	100 to 400
Second	560	25	(not determined)		
Third	700	30	(not determined)		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING From 1 to 4 acres per well
SAND CHARACTERISTICS - The First sand is frequently shaly and variable at the top and coarse-grained to pebbly in some places, with pebbles occuring at the bottom. The Second sand usually contains a bed of well cemented pebbles at the top. The sand is a gray, rather fine-grained, hard sand with a pebbly shale bed in the middle. The permeability is usually below 20 millidarcies. The Third sand is streaked and lobate and the thicker parts consist largely of conglomerate. Near the margins the pebbles disappear from the middle and lower parts of the sand and the sand is sugary with moderate to low permeability. The average porosity ranges from 11 to 16 percent and the permeability up to 3,000 millidarcies.

OPERATIONS - These fields were operated under vacuum for many years. Intensive air drive projects are very successful. Recovery of 2,000 barrels per acre or more, is expected in some projects.

REMARKS - The pebbly zones of the Petroleum Center field were flooded with surface water and the Pioneer field was also partly flooded about 1880. These fields were de-watered about 1920 and operated under vacuum until the air drive projects started. Initial productions originally were high. The Empire well, drilled in 1861, had an initial production of 3,000 barrels per day. The wells are pumped with jacks and central powers. The Third stray in this field is thin and not very productive.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Dickey, Parke A., 1941, Pa. Geol. Survey, 4th Ser., Bull. M22.

VENANGO COUNTY, PENNSYLVANIA

ELD NAME Pithole - Cashup FIELD No. 56

OCATION Allegheny and Cornplanter
nango County Township
Titusville Quadrangle

ISCOVERY DATE AND WELL January 1865, United States well, Initial production - 800
rrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
rst	2 200	8 600 000	1 000 000	100 000
d Valley	4 000	20 000 000	3 000 000	300 000
cond	300	6 000 000	1 000 000	100 000
ird Stray	2 000	5 000 000	800 000	80 000
Total	8 500	39 600 000	5 800 000	580 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
rst	600	20	(not determined)	6-1/4	300
d Valley	700	20	20		
cond	750	20	20		
ird Stray	800	12	10		

RODUCING WELLS Unknown ABANDONED WELLS Unknown
ELL SPACING 1 to 5 acres per well
AND CHARACTERISTICS - The First sand is very variable in character as well as eal extent. The porosity ranges from 10 to 18 percent and the permeability varies dely. The Red Valley sand is rather uniform and is usually fine-grained, but may coarse and pebbly near the base. The porosity ranges from 15 to 18 percent. The rmeability is usually less than 300 millidarcies. The Second sand is rather hard, th a low permeability. The Third Stray sand is usually very pebbly. The porosity nges from 12 to 18 percent while the permeability is usually rather low.

PERATIONS - The air-gas drive projects in operation in this field have been ccessful, especially in the Red Valley sand. One project should produce 1500 rrels per acre from 20 feet of pay sand.

EMARKS - Jacks are used to pump the wells with a central power. The First nd is reported to contain water along the concave southern edge of the field. out 250 acres of Third Stray sand have been accidently flooded by fresh water, ile 200 acres in the Cashup area are inactive.

EFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator r National Defense (Unpublished); Dickey, Parke A., 1941, Pa. Geol. Survey, 4th r., Bull., M22.

VENANGO COUNTY, PENNSYLVANIA

FIELD NAME Pleasantville FIELD No. 54

LOCATION Oil Creek and Allegheny Township

Venango County Titusville Quadrangle

DISCOVERY DATE AND WELL February 1, 1868, Harmonial well in the boro of Pleasantvil
Initial production - 125 barrels daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
First	4 400	16 930 000	2 800 000	280 000
Red Valley	3 400	16 685 000	3 200 000	320 000
Second	5 100	24 000 000	3 000 000	300 000
Third Stray	8 170	20 000 000	3 000 000	300 000
Third	2 000	5 000 000	500 000	50 000
Total	23 070	82 615 000	12 500 000	1 250 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
First	600	30	19	6-1/4	250
Red Valley	600	20	17		
Second	650	20	20		
Third Stray	700	15	8		
Third	750	15	12		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING 2 to 5 acres per well

SAND CHARACTERISTICS - The First sand is coarse-grained and often pebbly with a porosity range from 19 to 23 percent and permeability up to 1,000 millidarcies. The Red Valley sand is clear and massive, especially in the upper part with some shale breaks and a few pebbly beds, with a porosity range from 15 to 18 percent and permeability up to 300 millidarcies. The Second sand is rather uniform in character, being usually fine, sometimes broken by beds of shale with occasional pebbly beds at the top, and a porosity range from 10 to 13 percent with a permeability of less than 30 millidarcies. The Third Stray sand is generally pebbly with a porosity range from 12 to 19 percent. Of the 7,000 productive acres, 2,500 acres are inactive due to accidental water floods. Air and gas drives have been unsuccessful in this sand and reserve calculations are based on the assumption that air and gas drive will work. The Third sand is fine-grained with a low porosity and permeability.

OPERATIONS - Repressuring with air and gas has been very successful in the richer fields, notably the First sand to the West and the Red Valley sand to the East of Pleasantville. It is estimated that about 800 barrels per acre will eventually be recovered as a result of the air-gas drive in the above two areas.

REMARKS - The Third Stray sand is very sensitive to water intrusion. The water from the basal coal measures causes considerable casing corrosion at a depth of about 100 feet when the well is located on the high plateau. A pumping system is used with a central power. Average initial production in 1948 was about 2 barrels per day.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Dickey, Parke A., 1941, Pa. Geol. Survey, 4th Ser., Bull. M 22.

VENANGO COUNTY, PENNSYLVANIA

ELD NAME Rattlesnake FIELD No. 57

OCATION Cornplanter Township
nango County Titusville Quadrangle

SCOVERY DATE AND WELL 1870

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
rst	450	2 000 000	300 000	30 000
d Valley	1 150	4 000 000	600 000	60 000
cond	1 200	6 000 000	1 000 000	100 000
ird Stray	600	800 000	100 000	10 000
Total	3 400	12 800 000	2 000 000	200 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
rst	600	40	20	6-1/4	300
d Valley	700	15	10		
cond	750	25	20		
ird Stray	850	5	5		

RODUCING WELLS Unknown ABANDONED WELLS Unknown

ELL SPACING 2 to 5 acres per well

AND CHARACTERISTICS - The Red Valley sand is rather broken and hard with a low ermeability. The Second sand is uniform, but hard and with a low permeability, sually below 20 millidarcies. The Third Stray sand is rather pebbly and of low ermeability.

PERATIONS - Part of the field is operated under successful air and gas drive.

EMARKS - About 150 acres of the Third Stray sand have been accidently flooded ith fresh water. No large wells were ever reported from this field. Much of he field is inactive. The wells are pumped with jacks and a central power.

EFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator or National Defense (Unpublished); Dickey, Parke A., 1941, Pa. Geol. Survey, 4th er., Bull. M22.

VENANGO COUNTY, PENNSYLVANIA

FIELD NAME Raymilton FIELD No. 68
LOCATION French Creek, Mineral (Sandy Lake) Town
Venango (Mercer) County Franklin and Stoneboro Quadrar
DISCOVERY DATE AND WELL 1870

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Third	1 570	4 700 000	940 000	94 000
Total	1 570	4 700 000	940 000	94 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Third	760 to 1080	10	8	6-1/4	500 to 800

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 300 feet between wells
SAND CHARACTERISTICS - The Third sand is uniform and fine-grained and all pay except for the top 1 to 2 feet, which contains small pebbles. The porosity averages 12 percent and the permeability is generally 10 millidarcies or less. The sand contains very little water.

OPERATIONS - Small scale air drive projects have been successful in this field. Water standing in open holes for years has apparently not entered the sand, because the oil production of off-set wells did not increase.

REMARKS - The wells are pumped with jacks and central powers. Initial productions of the early wells in this field reached 150 barrels of oil daily. Present production per well is about 1/10 barrel daily. New wells now have initial productions of 1 to 2 barrels of oil daily and almost no salt water. Part of this field is in Mercer County and is discussed in the Mercer County section. About 1/2 of the field in Venango County is inactive.

REFERENCE - Sherrill, R. E., and Matteson, L. S., 1941, Pa. Geol. Survey, 4th Ser., Bull. M24.

VENANGO COUNTY, PENNSYLVANIA

IELD NAME Shamburg FIELD No. 55
OCATION Oil Creek Township
enango County Titusville Quadrangle
ISCOVERY DATE AND WELL February 1866, Shamburg well

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
hird	5 000	25 000 000	5 000 000	500 000
Total	5 000	25 000 000	5 000 000	500 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
hird	650	30	(not determined)	6-1/4	250

RODUCING WELLS Unknown ABANDONED WELLS Unknown
/ELL SPACING 1 to 3 acres per well
AND CHARACTERISTICS - The Third sand ranges from 10 feet of fine sand in the outhern part of the field to 50 feet of coarse and very pebbly sand in the center f the field. An impermeable zone trending northwest passes thru Shamburg corners. ortheast of this zone the sand is moderately coarse and soft and has been flooded y the accidental intrusion of water. The porosity ranges between 11 and 15 per- ent and the permeability varies widely.

)PERATIONS - Suction was extensively used in this field and a great deal of atural gasoline was manufactured. The field is now being successfully operated nder air drive. An artificial water flood was attempted in this field, but ac- urate information as to its results is not obtainable. Presumably, it was un- uccessful.

EMARKS - About 240 acres of this field are inactive. Pumping jacks with central owers are used. Initial productions for some early wells were as much as 400 arrels per day. The Third Stray in this field is thin and not very productive.

EFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator or National Defense (Unpublished); Dickey, Parke A., 1941, Pa. Geol. Survey, th Ser., Bull. M22.

VENANGO COUNTY, PENNSYLVANIA

FIELD NAME Speechley FIELD No. 67
LOCATION Cranberry Townsh
Venango County Oil City Quadrang
DISCOVERY DATE AND WELL Speechley Gas Field - April 13, 1885; Discovered oil field while drilling for gas.

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Speechley	580	2 320 000	232 000	23 000
Total	580	2 320 000	232 000	23 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Speechley	1900	140	20	6-1/4	450

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 300 feet between wells
SAND CHARACTERISTICS - The Speechley sand is a dark gray to reddish chocolate brown and contains a few thin beds of shale. As a rule the sand is barren for the first 10 feet from the top. Gas is present between 10 and 40 feet in the sand. About 40 or 50 feet below the top the oil pay begins. The oil saturation continues for 10 to 30 feet, then salt water is encountered.

OPERATIONS - Secondary recovery methods have never been tried in this field.

REMARKS - The wells are pumped with jacks and central powers. The initial productions of wells range from 1 to 5 barrels per day. The wells decline very slowly and some produce a barrel or more daily for several years after they are drilled. In the bottom of the sand is a considerable amount of water. Drilling is generally stopped before reaching the water zone, because if penetrated, the water tends to flood out the oil pay.

REFERENCE - Dickey, Parke A., Sherrill, R. E., and Matteson, L. S., 1943, Pa. Geol. Survey, 4th Ser., Bull. M25.

VENANGO COUNTY, PENNSYLVANIA

ELD NAME Sugar Creek - Niles FIELD No. 62

CATION Sugar Creek and French Creek Township
enango County Franklin Quadrangle

SCOVERY DATE AND WELL 1859, Evans #1, Initial production - 15 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
rst				
(Sugar Creek)	900	9 500 000	1 080 000	108 000
(Niles)	500	2 250 000	180 000	18 000
Total	1 400	11 750 000	1 260 000	126 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
irst					
(Sugar Creek)	250 to 450	50	20	6-1/4,	160,
(Niles)	300 to 700	35	15	6-1/4	350

RODUCING WELLS Unknown ABANDONED WELLS Unknown
ELL SPACING About 300 feet between wells

AND CHARACTERISTICS - The First sand in the Sugar Creek field ranges in texture rom fine-grained to very pebbly. The pebble sand is generally poorly cemented. The and is reported to contain many crevices which contain very large quantities of water. n some areas the pay consists of four or five layers of good oil-bearing sand, separated by layers of sandstone containing very little oil. In the Niles field the irst sand consists of 15 feet or more of pebble pay sand underlain by 20 feet or ore of finer water-bearing sand. The permeability of the pebbly upper part of the and is as high as 12,000 millidarcies.

PERATIONS - A water flooding experiment in this field removed only a small amount f oil and was discontinued. Air drive projects in this field have recovered only small amount of oil and were discontinued. These projects were not economically uccessful, due to the high permeability of the sand.

EMARKS - The wells are pumped with jacks and a central power. Initial productions of the early wells were as high as 100 barrels per day. Salt water is produced in large quantities. In the Sugar Creek field, present initial productions ange from 1 to 5 barrels daily with average settled production of 1/4 to 1/8 of barrel. In the Niles field the production was spotty. Present average daily roduction is about 1/10 of a barrel. The wells are generally pumped 24 hours a ay. This field is almost completely inactive.

EFERENCE - Sherrill, R. E., and Matteson, L. S., 1941, Pa. Geol. Survey, 4th Ser., ull. M24.

VENANGO COUNTY, PENNSYLVANIA

FIELD NAME Walnut Bend FIELD No. 61
LOCATION President, Cornplanter and Cranberry Townsh
Venango County Oil City and Titusville Quadrang
DISCOVERY DATE AND WELL 1861

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Lytle	4 645	17 245 000	2 648 000	265 000
Second	3 240	3 240 000	259 000	26 000
Total	7 885	20 485 000	2 907 000	291 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Lytle	240 to 675	16	16	6-1/4	80 to 250
Second	600	15	(not determined)		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 300 feet between wells
SAND CHARACTERISTICS - The Lytle sand is for the most part a quite uniform, fine, clean sand, often soft and "pasty", unbroken by shale. Thin pebble beds usually occur at either the top of bottom or both. The permeability averages probably less than 200 millidarcies. The Second sand where productive, consists of a white, fine and very hard sandstone. The porosity and permeability are low. It is seldom pebbly except occasionally near the top.

OPERATIONS - The Lytle sand in this field has been subjected to successful air or gas drive.

REMARKS - Wells are pumped with jacks and a central power. Early initial productions of wells in the Lytle sand were as high as 1800 barrels daily. Present initial productions are as high as 5 to 10 barrels daily. The average production per well is about 1/10 of a barrel daily. Very little water is found in the Lytle sand, while several barrels of water are produced from the Second sand. Most of the production is from the Lytle sand.

REFERENCE - Dickey, Parke A., Sherrill, R. E., and Matteson, L. S., 1943, Pa. Geol. Survey, 4th Ser., Bull. M25.

WARREN COUNTY, PENNSYLVANIA

IELD NAME Bull Hill FIELD No. 34

OCATION Cherry Grove and Sheffield Township

arren County Sheffield Quadrangle

ISCOVERY DATE AND WELL 1899

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
londike	717	2 100 000	344 000	35 000
Total	717	2 100 000	344 000	35 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
londike	1900 to 2050	15	12	6-1/4	350 to 450

RODUCING WELLS Unknown ABANDONED WELLS Unknown

ELL SPACING 3.5 to 5 acres per well

AND CHARACTERISTICS - The Klondike sand is a brownish, tight, fine-grained andstone.

PERATIONS - No secondary recovery projects have been tried.

EMARKS - Jacks with central powers are used for pumping. Some of the first ells in the sand were large but the majority of the wells had initial production ranging from 5 to 15 barrels of oil daily. The reserves are approximations ince no cores have been taken and assuming that secondary recovery methods would e successful.

EFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator or National Defense (Unpublished); unpublished data from the files of the Pa. eol. Survey.

WARREN COUNTY, PENNSYLVANIA

FIELD NAME Cherry Grove FIELD No. 35
LOCATION Cherry Grove and Mead Townsh
Warren County Sheffield Quadrang
DISCOVERY DATE AND WELL March 10, 1882, Mystery well, Initial production - 2,000 barrels daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive (bbls.)	Recoverable by primary methods (bbls.)
Cherry Grove	2 496	8 000 000		(very little)
Total	2 496	8 000 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Cherry Grove	1400 to 1700	20	15	6-1/4	200 to 400

PRODUCING WELLS 15 ABANDONED WELLS 490
WELL SPACING 2 to 5 acres per well
SAND CHARACTERISTICS - The Cherry Grove sand consists of a white, fine- to coarse-grained sand with pebbles. The sand is very permeable and uniform over most of the field.

OPERATIONS - Only about 15 wells are producing in this field and the small outlying fields. The field has been flooded with either fresh or connate water and would have to be dewatered before any further operations could be started. Secondary recovery methods have never been tested.

REMARKS - The larges initial production was about 3,000 barrels per day. The wells declined rapidly and 8 months after the discovery well came in over 2/3 of the producing wells were abandoned. It is difficult from available data to predict whether this field can or cannot be reclaimed. From experience in other flooded Pennsylvania fields, it seems altogether possible that this field may have a profitable future. About 2,375 acres are inactive and 121 acres producing.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Carll, John F., 1883, Pa. 2nd Geol. Survey, Rpt. I 4; unpublished data from the files of the Pa. Geol. Survey.

WARREN COUNTY, PENNSYLVANIA

FIELD NAME Clarendon FIELD No. 29

LOCATION Pleasant, Glade, Mead, Kinzua, Cherry Grove and Sheffield Township

Warren County Warren and Sheffield Quadrangle

DISCOVERY DATE AND WELL January 12, 1878, Tolles #1, Initial production - 10 barrels daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
Clarendon	24 000 - Total area of field			
(richer)	10 000	47 000 000	15 250 000	1 100 000
(poorer)	14 000	50 000 000	2 500 000	200 000
Total	24 000	97 000 000	17 750 000	1 300 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Clarendon	975 to 1400	23	12	6-1/4	300 to 650

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING About 300 feet between wells

SAND CHARACTERISTICS - The Clarendon sand, as developed in the Clarendon field, usually consists of three parts, viz.: a thin "cap" rock, consisting of one to two and a half feet of well cemented, coarse-grained, conglomeratic sandstone; a pay zone, consisting of 8 to 16 feet of white, fairly hard, medium-grained sandstone; and a lower zone of light gray, finer grained sandstone containing much interbedded shale. Permeabilities in the pay zone range from 5 to 100 millidarcies; the average porosity is about 15 percent.

OPERATIONS - Air and gas repressuring has been tried in this field and was successful. The present method of secondary recovery is by water-flooding. About 9,440 acres have been subjected to water-flooding. About 7,560 acres are yet to be water flooded, while the remaining 14,000 acres will probably never be water flooded.

REMARKS - Jacks with a central power are used to pump the wells. The early initial productions were never very large in this field. The Clarendon sand never has produced any appreciable quantity of connate water. The wells produce practically all oil during the first 5 to 6 years of water flooding and then the oil production drops off rapidly with the production of water.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Fettke, Charles R., 1948, Water Flooding in Pennsylvania, A.P.I., Sec. Recovery of Oil in the U.S., Rev. ed. (In press).

WARREN COUNTY, PENNSYLVANIA

FIELD NAME Colorado - Goodwill Hill - Grand Valley **FIELD No.** 37
LOCATION Eldred, Southwest and Triumph **Townsl**
Warren **County** Titusville and Corry **Quadran**
DISCOVERY DATE AND WELL Colorado - 1870; Grand Valley - 1867, Atlast well

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
First	2 750	17 000 000	2 500 000	250 000
Third Stray	7 400	50 420 000	7 970 000	1 000 000
Third	600	1 300 000	50 000	5 000
Total	10 750	68 720 000	10 520 000	1 255 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
First	250 to 500	30		6-1/4	200 to 300
Third Stray	500 to 800	30	27		
Third	550 to 850	12			

PRODUCING WELLS Unknown **ABANDONED WELLS** Unknown
WELL SPACING 1 to 3 acres per well
SAND CHARACTERISTICS - The First sand is extremely variable and changes rapidly laterally. Pebbles are present, especially at the top and base, but the pay beds are mostly white sand with occasional beds of shale. The permeability is usually less than 300 millidarcies. The Third Stray sand consists of beds of white, fine, hard sandstone with thinner beds of sandy shale usually irregularly bedded and lumpy, pebbly in certain beds and pebbly on top and bottom. The porosity ranges from 12 to 20 percent. The permeability is variable, but usually less than 400 millidarcies. The Third sand is usually fine and hard.

OPERATIONS - This field was operated under vacuum from 1910 to 1930. At present most of the field is operated under air drive which has been very successful. An ultimate recovery of nearly 3,000 barrels per acre is expected from one property.

REMARKS - Jacks with central powers are used to pump the wells along with individual electric jacks. Originally initial productions were as high as several hundred barrels of oil daily. At present initial productions range from 1/2 to 5 barrels per day. Water floods have been attempted in several places in this field. The usual result was a large increase in water production with no increase in oil.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Dickey, Parke A., 1941, Pa. Geol. Survey, 4th Ser., Bull. M22.

FIELD NAME Cooper FIELD No. 33

LOCATION Sheffield, Cherry Grove (Wetmore, Hamilton and Howe) Township

Warren (McKean, Forest) County Sheffield and Kane Quadrangle

DISCOVERY DATE AND WELL October 1882

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air, gas or water drive (bbls.)	Recoverable by primary methods (bbls.)
Clarendon	116	350 000	120 000	12 000
Cherry Grove	222	1 110 000	330 000	33 000
Cooper	4 421	31 000 000	6 000 000	500 000
Total	4 759	32 460 000	6 450 000	545 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Clarendon	1100 to 1700	20	15	6-1/4	300 to 400
Cherry Grove	1200 to 1800	17	12		
Cooper	1300 to 2000	20	15		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING 1 to 5 acres per well

SAND CHARACTERISTICS - The Clarendon sand consists of a white, fairly hard medium-grained sandstone with some interbedded shale. The Cherry Grove is a white fine- to coarse-grained sand. The Cooper sand consists of a reddish, fine-grained sand to a white, coarse-grained sand. The white sand is the most permeable and occurs associated with the red sand. The white sand may occur either at the top, middle, or bottom of the sand body. The porosity averages between 12 to 15 percent. In some areas the permeability is under 50 millidarcies but maximum permeabilities in the order of 3,000 millidarcies may be expected.

OPERATIONS - All methods of secondary recovery have been applied to the Cooper sand and where intensively applied have been successful in the majority of attemps. Recent water flooding experiments indicate that this method can be profitably used in many parts of the Cooper sand field. The other sands are spotty in production and it would not be economical to operate them under secondary recovery.

REMARKS - Jacks with central powers are used to pump the wells. Original initial productions were as high as 1,000 barrels of oil per day. Some of this Cooper field lies in Forest and McKean Counties and will be reported in the county sections. The first well in the area was Blue Jay #1 and was drilled in 1880 with an initial production of 5 barrels daily.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Carll, John F., 1883, Pa. 2nd Geol. Survey, Rpt. I 4; Unpublished data from the files of the Pa. Geol. Survey.

WARREN COUNTY, PENNSYLVANIA

FIELD NAME Deerlick FIELD No. 32
LOCATION Sheffield Township
Warren County Kinzua, Sheffield and Kane Quadrang
DISCOVERY DATE AND WELL 1900

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ... (bbls.)	Recoverable by primary methods (bbls.)
Deerlick	350	1 750 000		
Total	350	1 750 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Deerlick	1600 to 2050	20	15	6-1/4	300 to 450

PRODUCING WELLS None ABANDONED WELLS 76
WELL SPACING 4 acres per well
SAND CHARACTERISTICS - No information is available on the Deerlick sand but it must have been fairly coarse and open for many large wells were drilled in the early years.

OPERATIONS - Water flooding was tried in this field and was successful as long as the flood was controlled. Water was introduced into the sand by pulling the casing in flooded out wells and allowing the water to enter the sand.

REMARKS - Jacks with central powers were used to pump the wells. When the water flood project was started the wells increased in production to 40 barrels a day. The flood was in operation for 3 or 4 years until it got out of control. The sand is now flooded and would have to be dewatered before any projects could be started. The field is entirely inactive.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); unpublished data from the files of the Pa. Geol. Survey.

WARREN COUNTY, PENNSYLVANIA

FIELD NAME Dew Drop **FIELD No.** 31
LOCATION Corydon, Kinzua (Hamilton) **Township**
Warren (McKean) **County** Kinzua **Quadrangle**
DISCOVERY DATE AND WELL April 24, 1880, Van Scoy #2, Initial production - 30 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Dew Drop	586	3 000 000		
Total	586	3 000 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Dew Drop	800	40	10	6-1/4	250

PRODUCING WELLS None **ABANDONED WELLS** All
WELL SPACING About 400 feet between wells
SAND CHARACTERISTICS - Where productive the Dew Drop sand is white, fine- to medium-grained. One or two feet of a pebbly cap rock are sometimes present. The bottom of the sand is generally blue and fine-grained.

OPERATIONS - An experimental water flood was tried in this field but was unsuccessful.

REMARKS - This field was pumped with jacks and central powers but at the present is entirely inactive. The sand is probably entirely watered out. The Dew Drop sand is in the Clarendon horizon. Part of this field is in McKean County but it is discussed entirely here.

REFERENCE - Unpublished data from the files of the Pa. Geol. Survey.

WARREN COUNTY, PENNSYLVANIA

FIELD NAME Gartland FIELD No. 26
LOCATION Mead and Glade Township
Warren County Warren Quadrang
DISCOVERY DATE AND WELL 1876, Schatzle #1, Initial production - 1,500 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Gartland	1 793	5 379 000	1 000 000	100 000
Total	1 793	5 379 000	1 000 000	100 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Gartland	900 to 1500	20	10	6-1/4	200 to 400

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 1 to 3 acres per well
SAND CHARACTERISTICS - The Gartland sand is a grayish, coarse-grained, consolidated sandstone. Some of the grains are black and reddish in color. The average porosity is about 12 percent. Average permeabilities of three wells range from 190 to 3,000 millidarcies with a high of 10,000 millidarcies.

OPERATIONS - This field has responded very favorably to air-gas drive.

REMARKS - Jacks with central power are used for pumping the wells. The present initial productions range from 1 to 5 barrels of oil per day.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); unpublished data from the files of the Pa. Geol. Survey.

WARREN COUNTY, PENNSYLVANIA

FIELD NAME Glade FIELD No. 25

LOCATION Conewango, Mead and Glade Township

Warren County Warren Quadrangle

DISCOVERY DATE AND WELL 1875, Beatty #1, Initial production - 5 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Glade				
(poorer)	2 922	10 200 000		50 000
(richer)	3 000	15 000 000	3 000 000	300 000
Total	5 922	25 200 000	3 000 000	350 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Glade	500 to 1300	30	20	6-1/4	200 to 400

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING 1 to 3 acres per well

SAND CHARACTERISTICS - The Glade sand ranges from a fine- to a coarse-grained sand. The porosity ranges from 6 to 17 percent and the permeability from .02 to 94 millidarcies. The sand consists of alternate beds of sand from 1/10 to 3-3/10 feet thick and shale 1/10 to 2/5 foot thick.

OPERATIONS - A secondary recovery project has been in operation with air and gas drive but it was not very successful. Another project with intensive air-gas drive increased the oil production but not enough information is available to evaluate it. This field does not look very favorable for secondary recovery.

REMARKS - Jacks with central power are used for pumping the wells. About 22 percent of this field lies under the city of Warren and is inactive. Another outlying 2 percent is inactive. Present initial productions range from 1 to 3 barrels per day of oil. Original initial productions of many wells were as high as 100 barrels of oil per day.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); unpublished data from the files of the Pa. Geol. Survey.

WARREN COUNTY, PENNSYLVANIA

FIELD NAME Kinzua FIELD No. 30
LOCATION Corydon and Glade Townshi
Warren County Kinzua and Warren Quadrangl
DISCOVERY DATE AND WELL 1880, Fogel well, Initial production - about 1,000 barrels daily.

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Kinzua				
(poorer)	475	1 400 000		5 000
(richer)	100	500 000	150 000	15 000
Total	575	1 900 000	150 000	20 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Kinzua	700 to 1400	20	10	6-1/4	350

PRODUCING WELLS 106 ABANDONED WELLS 57
WELL SPACING About 300 feet between wells
SAND CHARACTERISTICS - The Kinzua sand is in the Clarendon horizon. It is, where productive, a white or light gray, medium- to coarse-grained, somewhat conglomeratic sandstone.

OPERATIONS - Vacuum has been used in parts of this field for years. One air-gas drive project was tried but was unsuccessful. Sections of this field have possibilities of air or gas drive.

REMARKS - The wells are pumped with jacks and central powers. The pay is irregular and occurs at different places in the sand. Wells 100 feet apart have pumped from entirely different sections of the sand. Some water is generally pumped with the oil. Part of this field has been watered out with fresh water from the flood waters of the Allegheny river.

REFERENCE - Unpublished data from the files of the Pa. Geol. Survey.

WARREN COUNTY, PENNSYLVANIA

FIELD NAME Morrison Run FIELD No. 28

LOCATION Pleasant and Mead Township

Warren County Warren Quadrangle

DISCOVERY DATE AND WELL 1883

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive water flooding (bbls.)	Recoverable by primary methods (bbls.)
Glade	1 300	5 000 000	1 300 000	130 000
Clarendon	870	1 000 000		30 000
Total	2 170	6 000 000	1 300 000	160 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Glade	1000 to 1400	40	15	6-1/4	400
Clarendon	1100 to 1500	22	20		

PRODUCING WELLS 150 ABANDONED WELLS 30

WELL SPACING 300 to 500 feet between wells

SAND CHARACTERISTICS - The Glade sand is capped by a foot of hard siltstone containing pebbles about 3/10 inch in length. Underneath this are 10 feet of shaly sandstone followed by about 8 feet of white "sugar" pay sand. Then comes about 3 feet of shale and then about 7 feet more of pay. Below the second pay is shale. The Clarendon sand has a one foot cap rock containing pebbles 3/10 inch long. Under this cap rock is about 23 feet of shaly sandstone and then occurs about 20 feet of a coarse light gray pay sand with interbedded thin streaks of shale. Beneath this pay is shale.

OPERATIONS - A small gas drive project was tried in the Clarendon sand. The sand took the gas for a while, but the input pressure soon reached the capacity of the equipment and the project was shut down. A gas drive project is to be tried in the Glade sand. A well in the field has had water running into it for 4 years. This increased the oil production in a nearby well.

REMARKS - The wells are pumped with jacks and central powers. Wells in the Clarendon sand have initial productions at the present time up to 25 barrels of oil per day, but in about 2 weeks decline to 1 barrel per day. Wells in the Glade sand have initial productions up to 30 barrels per day and in about 1 week drop down to 1 barrel per day. The average oil production for the field is about 1/2 barrel per day per well. The oil to water ratio for Clarendon wells is about 30 to 1, while for Glade wells it is 3 to 1.

REFERENCE - Butts, Charles, 1910, U.S. Geol. Survey, Geol. Atlas 172; data from present producers in the field; unpublished data from the files of the Pa. Geol. Survey.

WARREN COUNTY, PENNSYLVANIA

FIELD NAME North Warren FIELD No. 23
LOCATION Conewango and Glade Township
Warren County Warren Quadrangle
DISCOVERY DATE AND WELL 1877

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ____ (bbls.)	Recoverable by primary methods (bbls.)
Glade	1 527	3 100 000		100 000
Total	1 527	3 100 000		100 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Glade	500 to 650	20	(unknown)	6-1/4	150 to 300

PRODUCING WELLS 120 ABANDONED WELLS 50
WELL SPACING 2 to 3 acres per well
SAND CHARACTERISTICS - The Glade sand in this area varies from a fine- to a coarse-grained, broken sand. Production in this area comes from different horizons and none of them is uniform. Some of the production is from shales.

OPERATIONS - An air-gas drive project was tried in this field but was unsuccessful. This field is looked on as being unfavorable for secondary recovery.

REMARKS - Wells in this field are pumped with individual units or jacks with central powers while some are bailed. Original initial productions were as high as 100 barrels per day of oil but the wells did not last very long.

REFERENCE - Carll, John F., 1883, Pa. 2nd Geol. Survey, Rpt. I 4; unpublished data from the files of the Pa. Geol. Survey.

WARREN COUNTY, PENNSYLVANIA

FIELD NAME Selkirk FIELD No. 38
LOCATION Eldred Township
Warren County Titusville Quadrangle
DISCOVERY DATE AND WELL 1884, R. T. Gilson #1

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
First	1 000	6 000 000	1 000 000	100 000
Third Stray	200	300 000	50 000	
Total	1 200	6 300 000	1 050 000	100 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
First	300 to 500	40	20	6-1/4	300 to 350
Third Stray	500 to 700	20	12		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING About 250 feet between wells
SAND CHARACTERISTICS - The First sand, for the first 10 feet, is generally coarse-grained and contains small pebbles. The pay zone occurs about 10 feet in the sand and is fine-grained and from cream to white in color. The porosity ranges from 12 to 17 percent and the permeability is usually less than 500 millidarcies. The Third Stray sand is usually fine and hard.

OPERATIONS - Air drive projects are being successfully operated in this field. A carefully planned experimental water flood was operated in this field, but the attempt was unsuccessful and the water production of the producing wells increased greatly with no increase in oil production.

REMARKS - Jacks with a central power are used to pump the wells. The early wells did not flow. Some of the early wells had initial productions up to 35 barrels per day of oil. The wells average about 1/2 barrel of oil per day and 2 barrels of water at the present time.

REFERENCE - Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Dickey, Parke A., 1941, Pa. Geol. Survey, 4th Ser., Bull. M22; data from present operators in the field.

WARREN COUNTY, PENNSYLVANIA

FIELD NAME Sill Run FIELD No. 27
LOCATION Pleasant Township
Warren County Warren Quadrangl
DISCOVERY DATE AND WELL 1874, Dingley well, small show of oil

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Glade	212	600 000		20 000
Total	212	600 000		20 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Glade	800	30		6-1/4	200

PRODUCING WELLS 47 ABANDONED WELLS 4
WELL SPACING 1 to 3 acres per well
SAND CHARACTERISTICS - The Glade sand is very tight with a low porosity and permeability. The average porosity is about 10 percent with an average permeability of .37 millidarcies. In the entire sand thickness there are 3 shale breaks in the cored well and the breaks range from 1/10 to 4/5 foot in thickness.

OPERATIONS - No secondary operations have been tried in this field; the sand is too tight and secondary recovery operations would probably be unsuccessful.

REMARKS - The wells are pumped with jacks and a central power.

REFERENCE - Carll, John F., 1883, Pa. 2nd Geol. Survey, Rpt. I 4; unpublished data from the files of the Pa. Geol. Survey.

WARREN COUNTY, PENNSYLVANIA

FIELD NAME Smith Corners FIELD No. 24
LOCATION Glade Township
Warren County Warren Quadrangle
DISCOVERY DATE AND WELL April 1899, Peter Smith well

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive ..... (bbls.)	Recoverable by primary methods (bbls.)
Glade	70	140 000		7 000
Total	70	140 000		7 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Glade	1100 to 1200	30	8	6-1/4	200 to 400

PRODUCING WELLS 9 ABANDONED WELLS 2
WELL SPACING 2 to 3 acres per well
SAND CHARACTERISTICS - The Glade sand in general is very tight but it occasionally contains more permeable sand beds.

OPERATIONS - Secondary recovery operations have not been tried in this area.

REMARKS - The wells are pumped by jacks with central powers.

REFERENCE - Unpublished data from the files of the Pa. Geol. Survey.

FIELD NAME Tidioute FIELD No. 36
LOCATION Triumph, Limestone, Deerfield, Southwest, Watson (Harmony) Townshi
Warren (Forest) County Tidioute and Titusville Quadrangl
DISCOVERY DATE AND WELL 1860

RESERVE ESTIMATE AS OF JANUARY 1, 1942

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
First	400	1 800 000	700 000	70 000
Red Valley	1 600	8 600 000	3 000 000	300 000
Third Stray	2 600	17 100 000	5 000 000	500 000
Third	100	375 000	150 000	15 000
Queen	800	2 500 000	600 000	15 000
Total	5 500	30 375 000	9 450 000	900 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
First	300 to 600	25	15	6-1/4	100 to 300
Red Valley	400 to 600	25	18		
Third Stray	430 to 730	35	(not determined)		
Third	350 to 700	15	(not determined)		
Queen	900 to 1400	10	10		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 1 to 3 acres per well

SAND CHARACTERISTICS - The First sand here occurs as local lenses or layers of white o gray, fine- to medium-grained sandstone in an irregular group of thin bedded shaly sandstone and sandy shales. The Red Valley sand is a gray, medium- to fine-grained sandstone. Small pebbles may be scattered throughout the sand but a thin pebble streak is usually present in the top. The Third Stray is a gray, medium coarse-grained sandstone and includes pebble layers especially at the top and bottom. Shale and hard nonproductive sand occur irregularly in it. The Third sand is usually fine and hard. The Queen sand occurs as a series of lenses at the bottom or in the lower part of a dark sandy shale or shaly sandstone. The sand is a white, coarse to pebbly sandstone.

OPERATIONS - Repressuring with air, gas or a mixture of the two is practiced in all the producing sands except the Third. Part of the field is under vacuum with the residue gas being recycled. Secondary recovery has been satisfactory in this field. One secondary recovery project in the Queen sand has met with fair success.

REMARKS - Jacks with a central power are used to pump the wells. Original initial productions were as high as 1,000 barrels of oil per day. Present initial productions range from 1 to 3 barrels of oil per day. This field consists of the Triumph Streak, the Fagundus, and the Red House fields. The Triumph Streak was flooded from poorly plugged wells about 1874, but was dewatered in 1898. The Red House field, discovered in 1922, was prolific but short lived and is practically entirely inactive. Part of this field is in Forest County but the entire field is discussed here.

REFERENCE - Cathcart, o. H., Sherrill, R. E., and Matteson, L. S., 1938, Pa. Geol. Survey, 4th Ser., P. R. 118; Dickey, Parke A., et al, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished).

WARREN COUNTY, PENNSYLVANIA

FIELD NAME Youngsville - Five Points (includes Sugar Grove, Chandlers Valley and Matthews Run fields) FIELD No. 22

LOCATION Sugar Grove, Farmington and Brokenstraw Township

Warren County Youngsville Quadrangle

DISCOVERY DATE AND WELL 1865

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Glade				
Five Points	250			
Sugar Grove	250			
Chandlers Valley	100	4 600 000	1 000 000	100 000
Matthews Run	150			
Youngsville	400			
Total	1 150	4 600 000	1 000 000	100 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Glade	700 to 1200	30	20	6-1/4	150 to 300

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING 1 to 3 acres per well

SAND CHARACTERISTICS - The Glade sand is a light gray to white, fine- to very fine grained, somewhat micaceous and generally hard sandstone. It may be somewhat pebbly. Locally the sand splits into two lenses. The lower lense carries the white sand where the sand is split and the upper lense is generally void of oil or gas. The pay usually occurs anywhere from 5 feet below the top to the middle of the sand body. The white sand generally carries the pay. The sand has a very low permeability, in many instances being impermeable at laboratory test pressures. The porosity ranges from 7 to 11 percent.

OPERATIONS - At present one secondary recovery project is nearing completion. It will be some time before the project can be evaluated. This area does not look promising for secondary recovery.

REMARKS - Gas is sometimes obtained in the top of the sand and saltwater is frequently obtained in the bottom of the sand. Wells are sometimes completed in the sand to avoid the saltwater. Jacks with a central power are used to pump the wells. The old wells will fill up and produce a small amount of oil after being abandoned. The reservoir pressure, in new wells a few locations from old wells, has been very close to the expected pressure in a virgin field. All these factors suggest the tightness of the sand. Present initial productions vary from 2 to 25 barrels of oil per day, but the wells decline in about a month to 1/3 of a barrel of oil per day.

REFERENCE - Unpublished data from the files of the Pa. Geol. Survey.

WASHINGTON COUNTY, PENNSYLVANIA

FIELD NAME Burgettstown FIELD No. 145
LOCATION Smith and Cross Creek Townsh
Washington County Burgettstown Quadrang
DISCOVERY DATE AND WELL 1890

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	2 225	3 560 000	890 000	89 000
Total	2 225	3 560 000	890 000	89 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	2070	9 to 12	8	8-1/4, 6-1/4	300, 1200

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 400 to 600 feet
SAND CHARACTERISTICS - The Hundred Foot sand is hard, fine- to coarse-grained. Some wells have a pay in the top and one in the bottom of the sand. These are separated by a hard, tight sand.

OPERATIONS - Some water flooding has been tried with no effect on production. Repressuring with gas was also tried, but with no success. On the Tope Estate, an operator has the wells under vacuum.

REMARKS - The field might be tested further for repressuring and perhaps with water flooding, using pumps to get adequate pressure. None of the wells were very large producers, seldom exceeding 100 barrels per day. Most of the wells are pumped by gas engines. Some are pumped by pumping jacks with individual engines. Very little salt water is produced and there is no known fresh water flooding of wells.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Shaw, E. W., and Munn, M. J., 1911a, U. S. Geol. Survey, Geol. Atlas 177; data from present operators in the field.

WASHINGTON COUNTY, PENNSYLVANIA

FIELD NAME Canonsburg FIELD No. 142

LOCATION Chartiers, Cecil, North Strabane and Peters Township

Washington County Carnegie Quadrangle

DISCOVERY DATE AND WELL 1888

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Gordon Stray	98	137 000	34 000	3 000
Gordon	273	437 000	109 000	11 000
Fifth	1 616	2 586 000	646 000	65 000
Total	1 987	3 160 000	789 000	79 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Gordon Stray	2200	30	7	10, 8-1/4, 6-5/8	500 (below Pgh. coal), 0 below gas sand, 1550 (in Big lime)
Gordon	2275	30	8		
Fifth	2400	13	8		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown

WELL SPACING 200 to 800 feet

SAND CHARACTERISTICS - The Gordon sand is fine- to medium-grained with a softer pay streak. The Fifth is usually hard and fine-grained with a pebbly pay.

OPERATIONS - Secondary recovery operations have not been tried in this area.

REMARKS - Initial productions from the Gordon were as high as 400 barrels per day and from the Fifth, up to 350 barrels. An average from both sands was 25 to 30 barrels. Future production by secondary recovery is unlikely. This is essentially a gas field. About 95 percent of the field is inactive.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Shaw, E. W., and Munn, M. J., 1911a, U.S. Geol. Survey, Geol. Atlas 177; data from present operators in the field.

WASHINGTON COUNTY, PENNSYLVANIA

FIELD NAME Cecil and Mawhinney FIELD No. 141
LOCATION Cecil Township
Washington County Carnegie Quadrang
DISCOVERY DATE AND WELL 1895

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	294	529 000		
Total	294	529 000		

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	2100	80	9	10, 8-1/4, 6-1/4	200, 950, 1350

PRODUCING WELLS None ABANDONED WELLS All
WELL SPACING About 500 feet between wells
SAND CHARACTERISTICS - The Hundred Foot sand is quartzose, very fine to coarse-grained, and conglomeratic with a few interbedded shale beds. The pay is usually in the top of the sand and is light gray, coarse, loose and conglomeratic.

OPERATIONS - Secondary recovery operations have not been tried in this field.

REMARKS - The Hundred Foot sand in this area is completely flooded by fresh water and the field is entirely inactive. The best well (Mawhinney No. 2) came in at 160 barrels per hour from a depth of 2257 feet. The Cecil Field was discovered soon after the Mawhinney No. 2 was drilled in.

REFERENCE - Shaw, E. W., and Munn, M. J., 1911a, U. S. Geol. Survey, Geol. Atlas 177; data from former operators in the field.

FIELD NAME Florence FIELD No. 144
LOCATION Hanover (Hanover) Township
Washington (Beaver) County Burgettstown Quadrangle
DISCOVERY DATE AND WELL 1889, Armour #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	3 735	5 976 000	1 494 000	149 000
Total	3 735	5 976 000	1 494 000	149 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1900	17	8	10, 8-1/4, 6-5/8, 4-7/8	50, 600, 1100, 1300

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 600 to 1000 feet
SAND CHARACTERISTICS - The Hundred Foot is a white to gray, fine- to coarse grained sandstone, with a coarse and pebbly pay. Sometimes the sand has a pay in the top and one in the bottom. These are separated by a hard tight sand zone.

OPERATIONS - Air or gas repressuring has been tried at a pressure of 500 p.s.i. but no favorable results were obtained.

REMARKS - About 80 percent of the field is inactive. Initial productions in most wells were about 15 barrels per day, but some made as high as 120 barrels. Very little salt water has been encountered. No known fresh water-flooding of the wells exists. Most of the wells are pumped by individual gas engines. Part of this field is in Beaver County and is discussed in that section.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Shaw, E. W., and Munn, M. J., 1911a, U. S. Geol. Survey, Geol. Atlas 177; data from present operators in the field.

FIELD NAME Lagonda FIELD No. 148
LOCATION South Franklin, Morris and East Finley Township
Washington County Claysville and Rogersville Quadrangl
DISCOVERY DATE AND WELL 1899

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Gordon Stray	621	994 000	248 000	25 000
Gordon	88	106 000	26 000	3 000
Fourth	598	478 000	120 000	12 000
Fifth	1 949	1 949 000	487 000	49 000
Total	3 256	3 527 000	881 000	89 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Gordon Stray	2600	30	8	10,	600,
Gordon	2640	40	6	8-1/4,	1300,
Fourth	2700	25	4	6-5/8	1600
Fifth	2750	20	5		

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 300 to 100 feet (average 700)
SAND CHARACTERISTICS - The Gordon Stray is a white, gray, or reddish, lenticular sandstone. The Gordon is a succession of layers of light gray, quartzose, fine- to coarse-grained sandstone, containing occasional lenses of conglomerate. The Fourth is light gray, medium-grained and frequently conglomeratic. The Fifth is similar to the Fourth but has thicker conglomeratic lenses.

OPERATIONS - In 1942, northeast of Pleasant Grove, gas repressuring in the Fifth was tried at 70 to 80 p.s.i. pressure. Production from 6 wells increased from 50 to 140 barrels per month and from 5 others the production increased from 76 to 120 barrels per month. Also northwest of Prosperity (Craft Creek), repressuring was tried, but with no success. The sand was too tight to take the 300 to 350 p.s.i. pressure. This project may be tried again. It is also reported that a Big Dunkard sand repressuring project was tried for 3 or 4 years, but with no success. Around 100 p.s.i. pressure was used.
REMARKS - About 86 percent of the field is inactive. Most wells produce some salt water in varying amounts. The wells are pumped by individual gas engines.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

FIELD NAME McDonald FIELD No. 143
LOCATION Cecil, Robinson (N.Fayette, S.Fayette, Collier and Robinson) Township
Washington(Allegheny) County Burgettstown and Carnegie Quadrangle
DISCOVERY DATE AND WELL 1890, McDonald #1, Initial production - 12 barrels daily

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	120	196 000	42 000	4 000
Gordon	5 479	12 465 000	2 685 000	269 000
Fifth	1 208	2 748 000	692 000	69 000
Total	6 807	15 409 000	3 419 000	342 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	1926	85	5	10,	150,
Gordon	2186	22	7	8-1/4,	1125,
Fifth	2306	25	7	6-5/8,	1330,
				5-3/16	2100

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 400 to 800 feet (average 600)

SAND CHARACTERISTICS - The Hundred Foot sand is a quartzose, very fine to coarse grained conglomeratic sandstone, with a few interbedded shales. The Gordon sand is a light gray to white, highly quartzose, fine-grained to conglomeratic sandstone. Some wells have two pays in the Gordon. These are separated by a dense, fine-grained sand or sandy shale lense. The Fifth sand is highly quartzose, fine-grained to conglomeratic and light gray to white in color, with a few shale breaks. Occasionally there are several pays which are separated by a tight sand or shale bed.

OPERATIONS - A large area of Gordon sand, in this field, has been under gas repressuring. Oil recovery by this method has been over 100 barrels per acre foot on one individual lease. Natural water flooding, in some areas, has greatly increased the production from both the Gordon and Fifth sands. The Fifth sand is also under vacuum.

REMARKS - The Hundred Foot sand may have 2 pay zones, the Gordon 2 and the Fifth may have several. The Hundred Foot frequently contains salt water. The Gordon has some in the southeastern and eastern part of the field and the Fifth contains very little. Most of the production comes from the Fifth and Gordon sands. Initial productions were as high as 14,000 barrels per day, but now the average initial production is 1 barrel per day. The wells are pumped by individual gas engines. Part of this field is in Allegheny County and is discussed in that section.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

WASHINGTON COUNTY, PENNSYLVANIA

FIELD NAME McMurray — FIELD No. 140
LOCATION Peters (Bethel) Township
Washington (Allegheny) County — Carnegie Quadrangle
DISCOVERY DATE AND WELL About 1888

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	810	1 134 000	284 000	28 000
Total	810	1 134 000	284 000	28 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	2150	80	7 to 8	10, 8-1/4, 6-5/8	300, 1175, 1400

PRODUCING WELLS Unknown — ABANDONED WELLS Unknown
WELL SPACING 200 to 800 feet
SAND CHARACTERISTICS - The sand ranges from a very fine to coarse-grained sandstone, conglomeratic in places, with some interbedded shale beds.

OPERATIONS - No secondary recovery has been tried in this field.

REMARKS - Initial productions of early wells were as high as 85 barrels per day and some recent wells have started at 15 barrels. About all of the field is inactive. Some salt water is encountered. The ratio of salt water to oil is about 4 to one. Part of this field is in Allegheny County and is discussed in that section.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Fettke, Charles R., Stephenson, Robert C., and Tignor, E. M., 1946, Pa. Geol. Survey, 4th Ser., Bull. M28; data from present operators in the field.

WASHINGTON COUNTY, PENNSYLVANIA

FIELD NAME Point Lookout FIELD No. 147

LOCATION South Franklin Township

Washington County Claysville Quadrangle

DISCOVERY DATE AND WELL 1919, Reed #1

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Fourth	65	65 000	16 000	2 000
Fifth	98	118 000	29 000	3 000
Total	163	183 000	45 000	5 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Fourth	2700	30	5	10,	600,
Fifth	2750	20	6	8-1/4, 6-5/8	1300, 1600

PRODUCING WELLS 8 ABANDONED WELLS 22

WELL SPACING 800 feet

SAND CHARACTERISTICS - The Fourth sand is white and coarse. One well is thought to have 2 pays about 10 feet apart. The Fifth sand is also white, but not as coarse as the Fourth. One pay is in the top of the sand and a second is about 15 feet below the first.

OPERATIONS - Secondary recovery operations have not been tried.

REMARKS - Initial productions of Fourth sand wells ranged from 4 to 40 barrels per day. The Fifth sand had initial productions of around 30 barrels per day. Most of the wells are Fifth sand wells. The wells make about 1/4 barrel of salt water to 1 barrel of oil. No fresh water flooding out of the wells is known. The wells are pumped by individual gas engines.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

WASHINGTON COUNTY, PENNSYLVANIA

FIELD NAME Venice FIELD No. 139
LOCATION Chartiers, Cecil, Mt. Pleasant (South Fayette) Townsh
Washington(Allegheny)County Carnegie and Burgettstown Quadrang
DISCOVERY DATE AND WELL 1893

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Hundred Foot	240	432 000	108 000	11 000
Gordon Stray	99	139 000	35 000	4 000
Gordon	66	106 000	26 000	3 000
Fourth	2 788	5 218 000	1 305 000	131 000
Total	3 193	5 895 000	1 474 000	149 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Hundred Foot	2100	45	9	10,	150,
Gordon Stray	2200	15	7	8-1/4,	1125,
Gordon	2275	25	8	6-5/8,	1330,
Fourth	2330	20	9	5-3/16	2100

PRODUCING WELLS Unknown ABANDONED WELLS Unknown
WELL SPACING 400 to 800 feet (average 600)

SAND CHARACTERISTICS - The Hundred Foot is a quartzose, very fine to coarse-grained, conglomeratic sandstone, with a few interbedded shales. The Gordon Stray is a white, gray or reddish sandstone. The Gordon sand ranges from a fine-grained to a coarse-grained conglomeratic sandstone. The best Gordon sand wells have a coarse, pebbly pay. The Fourth sand is gray to grayish-brown, fine- to coarse-grained occasionally conglomeratic, and irregularly shaly. The pay is usually found in the medium- to coarse-grained "sugary" sand. Pebbles or cobbles are of various sizes and shapes.

OPERATIONS - Some secondary operations have been tried in the Fourth sand, near the town of Venice. The 5-3/16 inch casing is used only where much water is encountered in the Hundred Foot and Gordon sands.

REMARKS - The wells are pumped with individual gas engine units. About 70 percent of the field is inactive. Maximum initial productions were as high as 2000 barrels per day with an overall average of 200 barrels. During the last 20 years an initial production over 10 barrels is rare. Some salt water is produced from the Gordon and also a small amount is found in the Hundred Foot and Fourth sands. Future possible production will no doubt have to be confined to existing wells because of the high cost of drilling new wells for secondary recovery operations. Part of this field is in Allegheny County and is discussed in that section.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); data from present operators in the field.

WASHINGTON COUNTY, PENNSYLVANIA

FIELD NAME Washington - Taylorstown **FIELD No.** 146
LOCATION Buffalo, N. & S. Franklin, Canton, Blaine, N. & S. Strabane & Amwell Township
Washington County Claysville and Amity Quadrangle
DISCOVERY DATE AND WELL 1885, Gantz well

RESERVE ESTIMATE AS OF JANUARY 1, 1947

Producing sands	Acres	Total oil in place (bbls.)	Probably recoverable by intensive air or gas drive (bbls.)	Recoverable by primary methods (bbls.)
Gantz	3 460	5 450 000	1 210 000	120 000
Fifty Foot	2 237	5 800 000	1 250 000	125 000
Gordon Stray	143	326 000	70 000	7 000
Gordon	7 729	15 100 000	3 240 000	324 000
Fourth	2 628	6 000 000	1 290 000	129 000
Fifth	6 346	16 500 000	3 520 000	352 000
Total	22 543	49 176 000	10 580 000	1 057 000

Sands	Av. depth to sand (ft.)	Av. sand thickness (ft.)	Av. pay thickness (ft.)	Size of casing (in.)	Av. length of casing (ft.)
Gantz	2200	12	7	13, 10,	40 to 60,
Fifty Foot	2250	40	8	8-1/4,	600 to 700,
Gordon Stray	2450	25	7	5-3/16	1400, 1800,
Gordon	2525	25	6		2500
Fourth	2600	20	7		
Fifth	2650	20	8		

PRODUCING WELLS Unknown **ABANDONED WELLS** Unknown
WELL SPACING 300 to 1000 feet (average 700)
SAND CHARACTERISTICS - The Gantz is a light gray, quartzose, fine- to coarse grained sandstone. It is conglomeratic in places, and contains a few interbedded shale beds. The Fifty Foot is similar to the Gantz, but has more shale breaks and is finer grained. It is coarser near the top. The Gordon Stray is white, gray or reddish lensitic sandstone, ranging from less than 1 to 50 feet thick. The Gordon is a succession of layers of light, gray, quartzose, fine- to coarse-grained sandstone, containing occasional lenses of conglomerate. The Fourth is light gray, medium-grained sandstone frequently conglomeratic. The Fifth is similar to the Fourth, but contains thicker conglomeratic lenses.

OPERATIONS - Gas drive was started in 1923 in the Gordon sand. Recovery by this method has been as high as 100 barrels per acre foot. The Gantz responds very little to gas repressuring, because of the low permeability. A core report for the Gordon sand shows: permeability - 93.56 millidarcies, porosity - 20 percent.

REMARKS - The Gordon, Fourth and Fifth sand fields are about 50 percent inactive. The Gantz and Fifty Foot fields are about 90 percent inactive. Possibly the Fourth and Fifth sands will respond to repressuring as well as the Gordon. The maximum initial productions are as follows: Gantz - 500, Fourth - 1000, and Fifth - 80 barrels. Some connate water is found in the Gordon, but none in the others where they are productive.

REFERENCE - Anonymous, 1941, Report to the Petroleum Coordinator for National Defense (Unpublished); Clapp, F. G., 1907a, U.S. Geol. Survey, Geol. Atlas 144; Fettke, Charles R., Stephenson, Robert C., and Tignor, E. M., 1946, Pa. Geol. Survey, 4th Ser., Bull. M28; Munn, M. J., 1911 b, U.S. Geol. Survey, Geol. Atlas 180.

FIELDS BY NAME

Field Name	Field No.	County	Page
Dorseyville	127	Allegheny	78
Dotyville	47	Crawford	146
Duff City	119	Allegheny	79
Dunkard Creek	161	Greene	161
East Kinzua	14	McKean	181
Economy-Legionville	115	Beaver	105
Emlenton-Richey Run	71	Venango	206
Evans City-Glade Run	93	Butler	124
Ewings Mill	131	Allegheny	80
Florence	144	Washington	243
		Beaver	106
Fonner	149	Greene	162
Foster-Reno	64	Venango	207
Franklin-Oak Forest	63	Venango	208
Gaines	1	Tioga	200
Garrison	158	Greene	163
Gartland	26	Warren	230
Garvin	101	Butler	125
Glade	25	Warren	231
Glenfield-Mt. Nebo	122	Allegheny	81
Glenhazel	20	Elk	147
Glenshaw	126	Allegheny	82
Grays Fork	151	Greene	164
Guffy	17	McKean	182
Hamilton Corners	52	Venango	209
Hampton-Strong	65	Venango	210
Harbinson-Hollow	106	Beaver	107
Harmony-Zelienople	91	Butler	126
Hebron Center	2	Potter	198
Hooker	83	Butler	127
Hookstown	108	Beaver	108
Hoover	82	Butler	128
Imperial	134	Allegheny	83
Ingomar-Grubbs	123	Allegheny	84
Jefferson Center-Herman	98	Butler	129
Kane	19	Elk	148
		McKean	183
Kendall	110	Beaver	109
Kinzua	30	Warren	232
Klondike	12	McKean	184
Knox	103	Clarion	143
Lacy	42	Forest	152
Lagonda	148	Washington	244
Lantz	159	Greene	165
Lathrop	45	Jefferson	174
Leetsdale	120	Allegheny	85
Lewis Run	9	McKean	185
Lickskillet-Hopper	137	Allegheny	86
Little Creek	92	Butler	130
Mars-Glade Mills-Valencia	99	Butler	131
Marshburg	11	McKean	186

Field Name	Field No.	County	Page
Marvin Creek	16	McKean	187
McCormick	132	Allegheny	87
McDonald	143	Washington	245
		Allegheny	88
McMurray	140	Allegheny	89
		Washington	246
Millerstown	118	Allegheny	90
Milltown	129	Allegheny	91
Moody Hollow	6	McKean	188
Moon Run-Crafton	135	Allegheny	92
Morrison Run	28	Warren	233
Mount Morris	160	Greene	166
Muddy Creek	86	Butler	132
Music Mountain	10	McKean	189
Neville Island	130	Allegheny	93
New Freeport	157	Greene	167
New Galilee	105	Beaver	110
Nineveh	150	Greene	168
North Warren	23	Warren	234
Oakland	59	Venango	211
Octave	50	Venango	212
Oil City-Rouseville	60	Venango	213
Oneida	87	Butler	133
Ormsby	15	McKean	190
Parker	81	Butler	134
		Armstrong	100
Petroleum Center-Pioneer	58	Venango	214
Pithole-Cashup	56	Venango	215
Pleasantville	54	Venango	216
Point Lookout	147	Washington	247
Queen Junction	85	Butler	135
Rattlesnake	57	Venango	217
Raymilton	68	Venango	218
		Mercer	196
Red Brush	43	Forest	153
Renfrew-McCalmont	95	Butler	136
Rosenberry	79	Butler	137
Rural Ridge	128	Allegheny	94
Rutan	155	Greene	169
St. Marys	21	Elk	149
Salmon Creek	41	Forest	154
Sandle-Wildwood	125	Allegheny	95
Sartwell	7	McKean	191
Selkirk	38	Warren	235
Shamburg	55	Venango	219
Shannopin	111	Beaver	111
Shingle House	3	Potter	199
		McKean	192
Shira Streak	80	Butler	138
Sill Run	27	Warren	236
Slippery Rock	75	Lawrence	176
Smith Corners	24	Warren	237
Smith's Ferry	107	Beaver	112
Speechley	67	Venango	220
Sugar Creek-Niles	62	Venango	221

Field No.	Field Name	County	Page
114.	Cookson	Beaver	103
115.	Economy-Legionville	Beaver	105
116.	Brush Creek	Allegheny	75
117.	Bakerstown	Allegheny	73
		Butler	115
118.	Millerstown	Allegheny	90
119.	Duff City	Allegheny	79
120.	Leetsdale	Allegheny	85
121.	Coraopolis-Moon	Allegheny	77
122.	Glenfield-Mt. Nebo	Allegheny	81
123.	Ingomar-Grubbs	Allegheny	84
124.	Bellevue-Avalon	Allegheny	74
125.	Sandle-Wildwood	Allegheny	95
126.	Glenshaw	Allegheny	82
127.	Dorseyville	Allegheny	78
128.	Rural Ridge	Allegheny	94
129.	Milltown	Allegheny	91
130.	Neville Island	Allegheny	93
131.	Ewings Mill	Allegheny	80
132.	McCormick	Allegheny	87
133.	Aten	Allegheny	72
134.	Imperial	Allegheny	83
135.	Moon Run-Crafton	Allegheny	92
136.	Chartiers	Allegheny	76
137.	Lickskillet-Hopper	Allegheny	86
138.	Woodville	Allegheny	97
139.	Venice	Allegheny	96
		Washington	248
140.	McMurray	Allegheny	89
		Washington	246
141.	Cecil-Mawhinney	Washington	242
142.	Canonsburg	Washington	241
143.	McDonald	Washington	245
		Allegheny	88
144.	Florence	Washington	243
		Beaver	106
145.	Burgettstown	Washington	240
146.	Washington-Taylorstown	Washington	249
147.	Point Lookout	Washington	247
148.	Lagonda	Washington	244
149.	Fonner	Greene	162
150.	Nineveh	Greene	168
151.	Grays Fork	Greene	164
152.	Wright Run	Greene	172
153.	Bristoria	Greene	160
154.	Aleppo	Greene	157
155.	Rutan	Greene	169
156.	Board Tree	Greene	159
157.	New Freeport	Greene	167
158.	Garrison	Greene	163
159.	Lantz	Greene	165
160.	Mount Morris	Greene	166
161.	Dunkard Creek	Greene	161
162.	Tanner	Greene	170
163.	Whitely Creek	Greene	171
164.	Blackshire	Greene	158